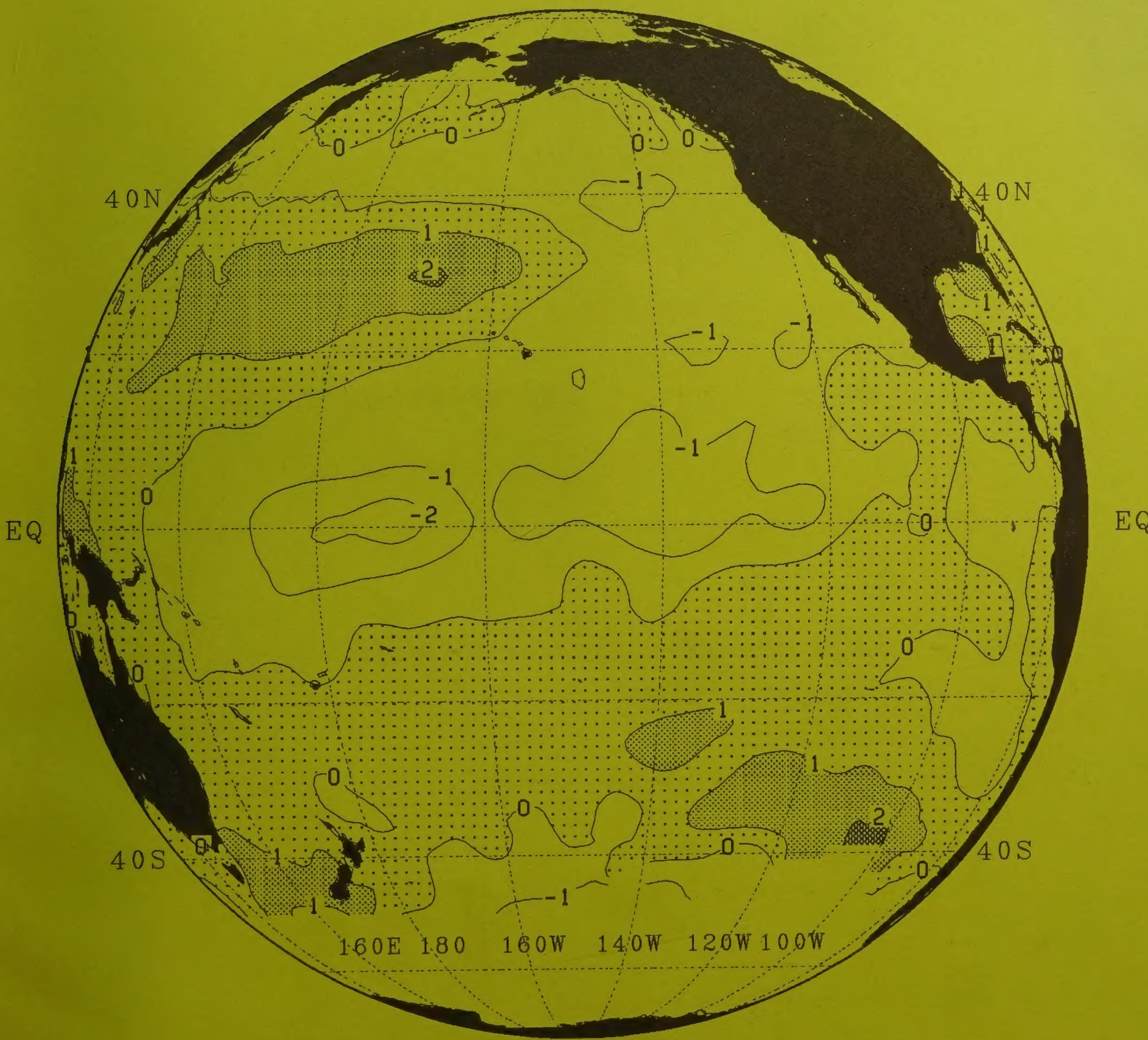
気 象 庁 海 洋 月 報

Monthly Ocean Report

February 1999 (No. 74)



Climate and Marine Department
Japan Meteorological Agency

気象庁　気候・海洋気象部

平成１１年２月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成しています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1999年２月の太平洋の月平均海面水温偏差図です。

陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for February 1999 in the Pacific Ocean.

Areas of positive anomalies are shaded.

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海況の特徴（１９９９年２月）

日本近海の海況

海面水温は，40° N以北で平年より１℃以上低いほかは平年より0.5℃以上高く，三陸・常磐沖から紀伊半島沖にかけては，東海沿岸で+0.5℃前後の正偏差だったのを除いて平年より１℃以上高かった（第4図）。

黒潮は，種子島付近で離岸，九州から紀伊半島にかけて接岸した後，東南東に流れ，上旬は32.5° N，139° E付近で北に向きを変え，八丈島の西を北上し，鹿島灘沖を東北東に流れていた。中・下旬は八丈島の南を通り，中旬は140° E，下旬は140.5° E付近を北上し，房総半島に接岸して，常磐沖を北東に流れていた（第9図）。

親潮系の冷水の沿岸寄りの分枝は40.5° N，142.5° Eまで，沖合の分枝は39.5° N，145.5° Eまで，それぞれ達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は，155° Eから115° Wにかけて平年より低く，170° Eから120° Wにかけて－１℃を超える負偏差域が見られた。150° E以西では，＋0.5℃以上の正偏差が持続していた。

北太平洋では，フィリピンの北及び30° Nに沿って日本の南から160° Wにかけて平年より１℃以上高い海域が広がっていた。40° N，140° W付近には－１℃以下の負偏差域が見られた（第16図）。

Highlights February 1999

Seas adjacent to Japan

SSTs were more than 0.5°C above normal around Japan except north of 40°N where negative SST anomalies exceeding -1°C prevailed. Positive SST anomalies exceeding +1°C prevailed in seas from off Sanriku and Joban to off the Kii Peninsula, except in seas adjacent to Tokai where SSTs were more than 0.5°C above normal (Fig. 4).

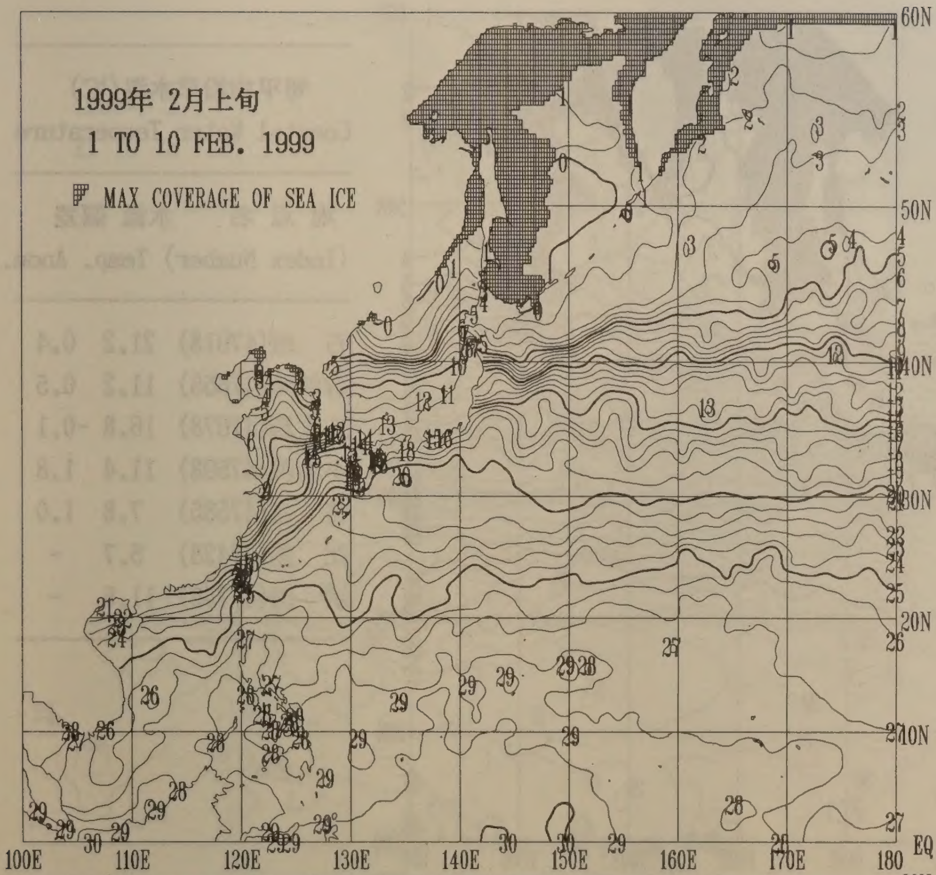
The Kuroshio flowed off Tanegashima, then flowed along the coasts from Kyushu to the Kii Peninsula and flowed ESE-ward off Tokai. It turned northward near 32.5°N, 139°E, passed west of Hachijo Island, and flowed ENE-ward off Kashima-nada in the first 10-day of the month. It passed south of Hachijo Island and flowed northward along 140°E in the second 10-day and 140.5°E in the last 10-day of the month, respectively, then approached the Boso Peninsula and flowed northeastward off Joban (Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 40.5°N, 142.5°E and 39.5°N, 145.5°E, respectively (Fig. 5).

Pacific Ocean

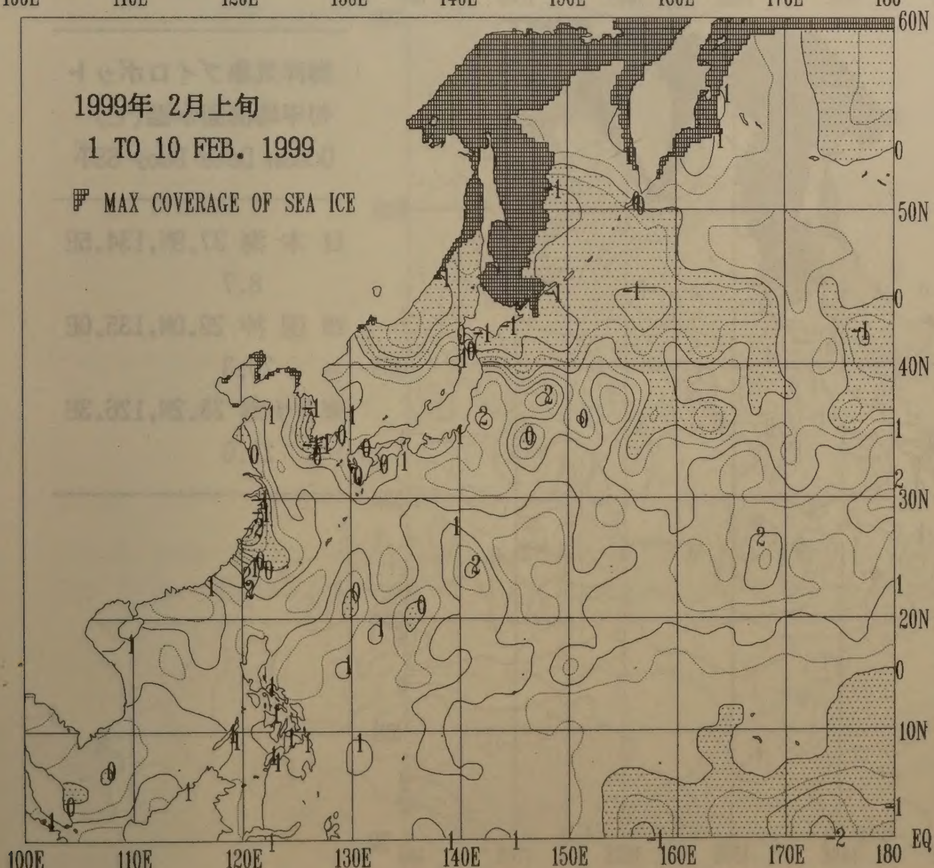
In the equatorial Pacific, negative SST anomalies prevailed from 155°E to 115°W, and those exceeding -1°C were observed between 170°E and 120°W. Positive SST anomalies exceeding +0.5°C remained west of 150°E.

In the North Pacific, positive SST anomalies exceeding +1°C prevailed in seas north of the Philippines and from south of Japan to 160°W along 30°N. Negative SST anomalies exceeding -1°C were observed around 40°N, 140°W (Fig. 16).



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	20.7	0.4
御前崎(47655)	10.5	0.0
八丈島(47678)	18.1	1.4
小名浜(47598)	11.3	1.6
宮　古(47585)	7.9	0.5
江　差(47428)	4.2	-
浜　田(47755)	12.4	-



海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

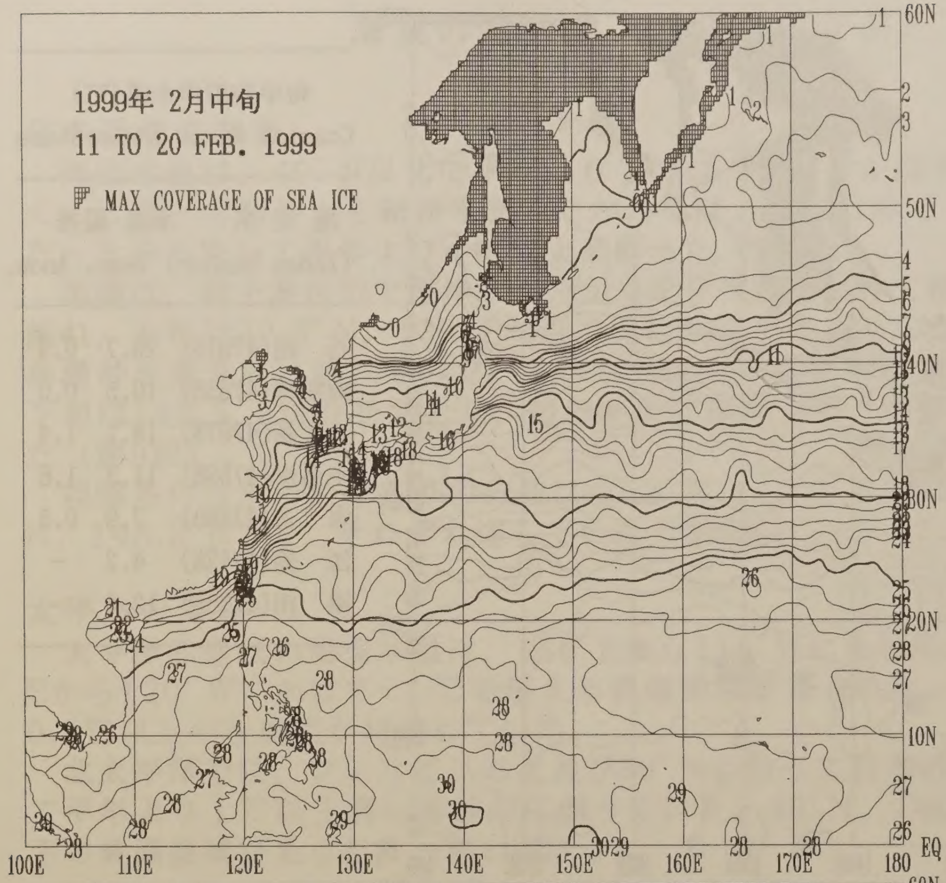
日本海 37.9N,134.5E
8.5

四国沖 29.0N,135.0E
20.7

東シナ海 28.2N,126.3E
21.9

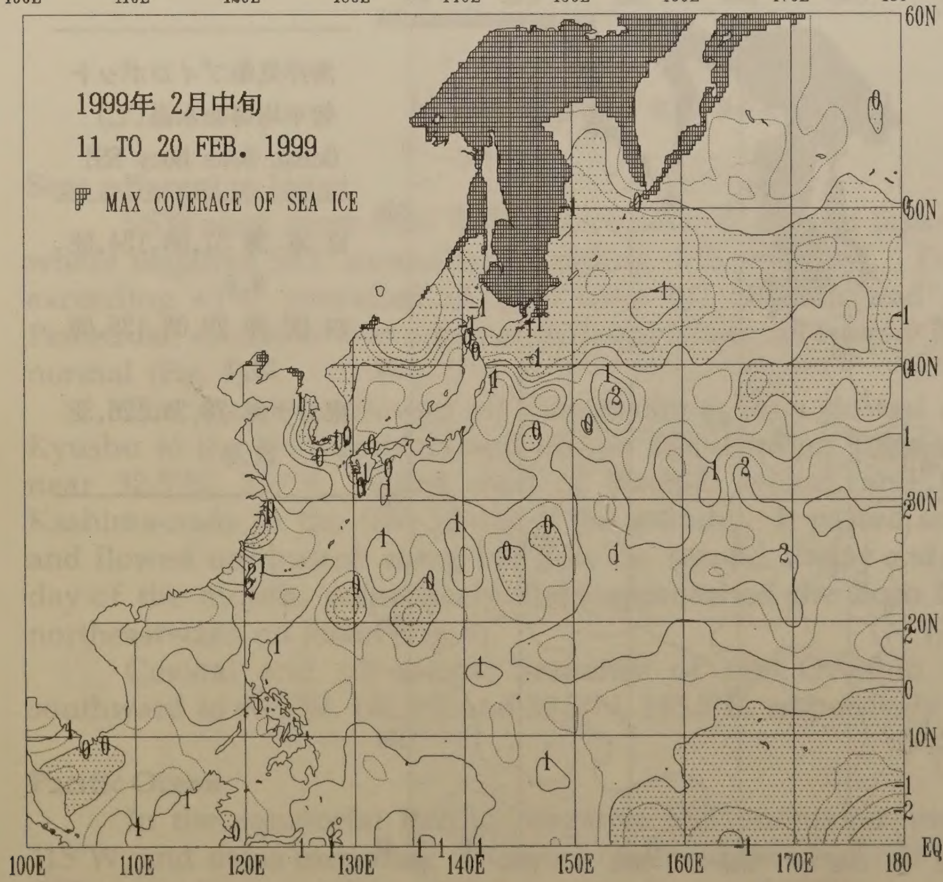
第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 2月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in FEB 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	21.2	0.4
御前崎(47655)	11.2	0.5
八丈島(47678)	16.8	-0.1
小名浜(47598)	11.4	1.8
宮　古(47585)	7.8	1.0
江　差(47428)	5.7	-
浜　田(47755)	11.5	-



海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

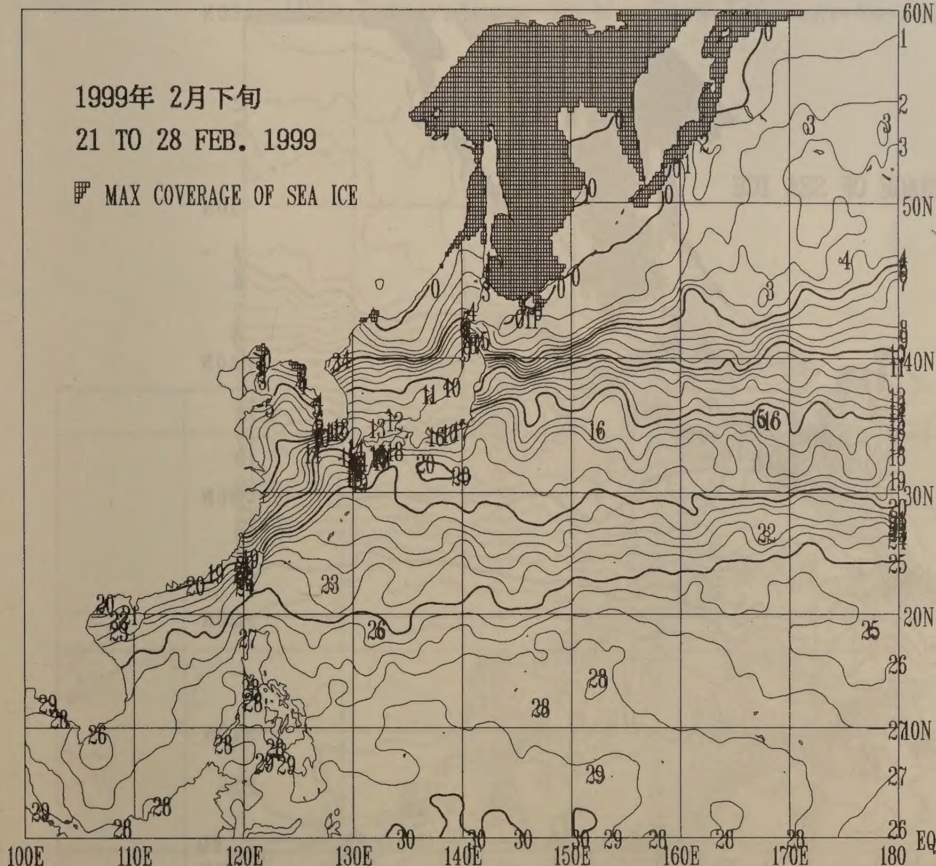
日 本 海 37.9N,134.5E
8.7

四 国 沖 29.0N,135.0E
20.3

東シナ海 28.2N,126.3E
21.0

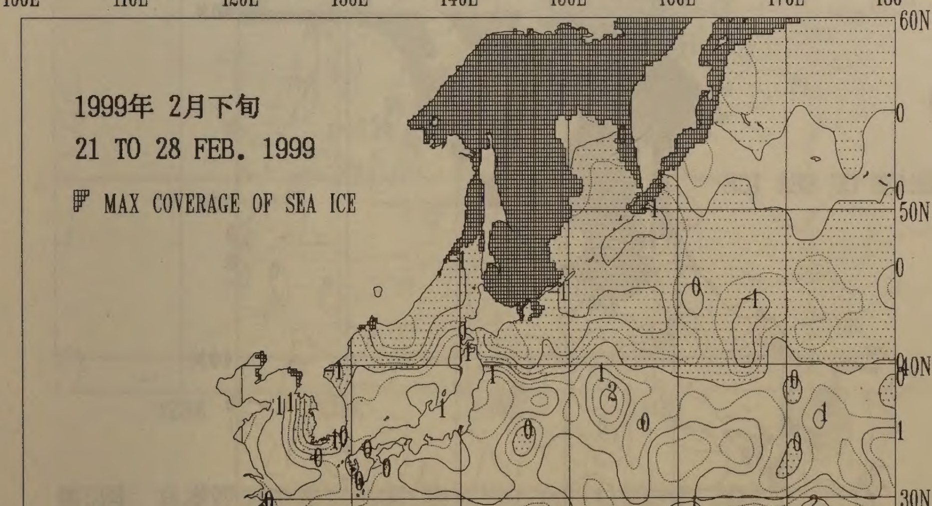
第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 2月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in FEB 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	22.1	1.2
御前崎(47655)	11.0	0.0
八丈島(47678)	15.4	-1.4
小名浜(47598)	11.6	2.5
宮　古(47585)	7.5	1.5
江　差(47428)	5.3	-
浜　田(47755)	11.5	-

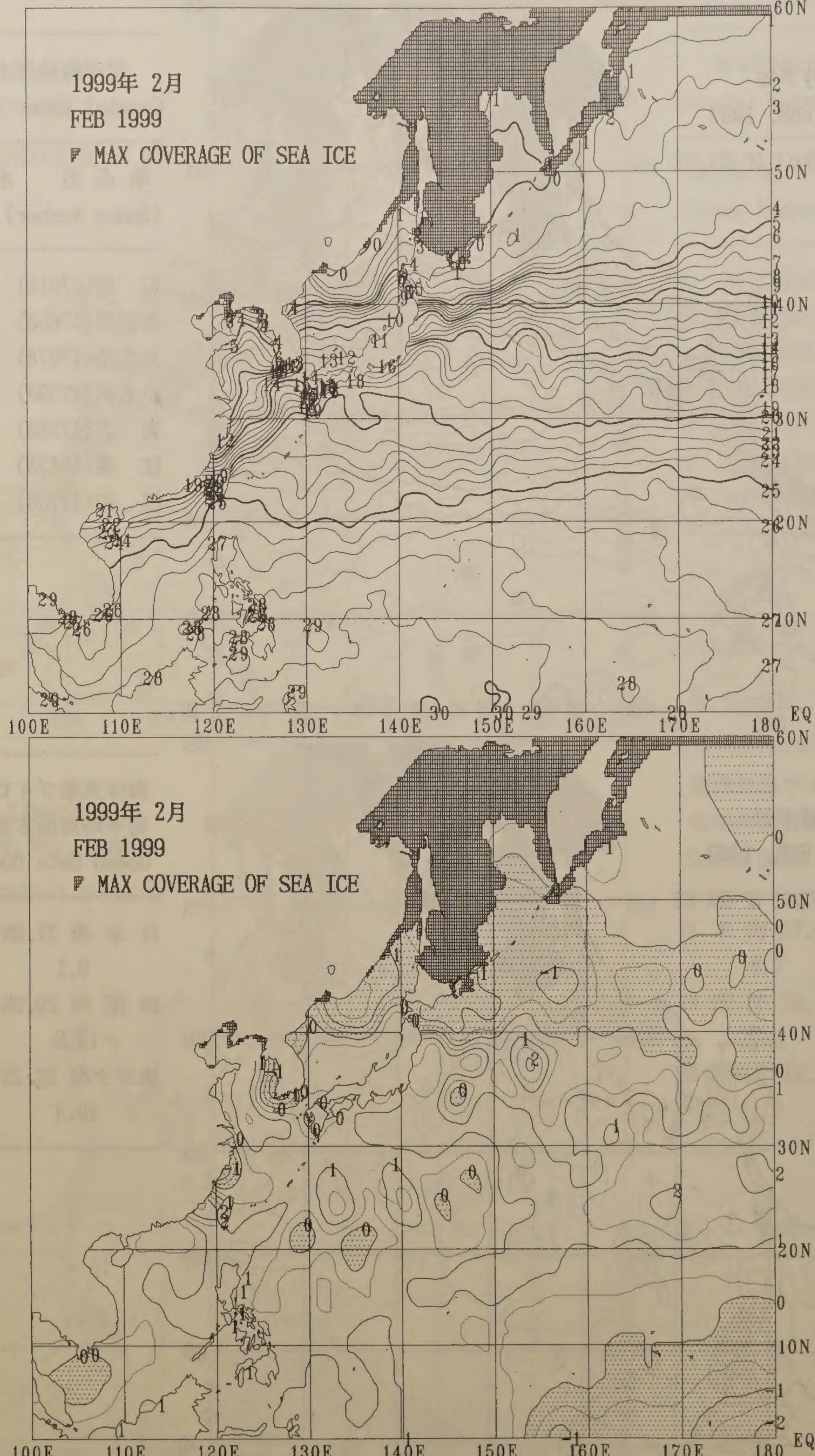


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	9.1
四国沖	29.0N,135.0E	19.6
東シナ海	28.2N,126.3E	20.4

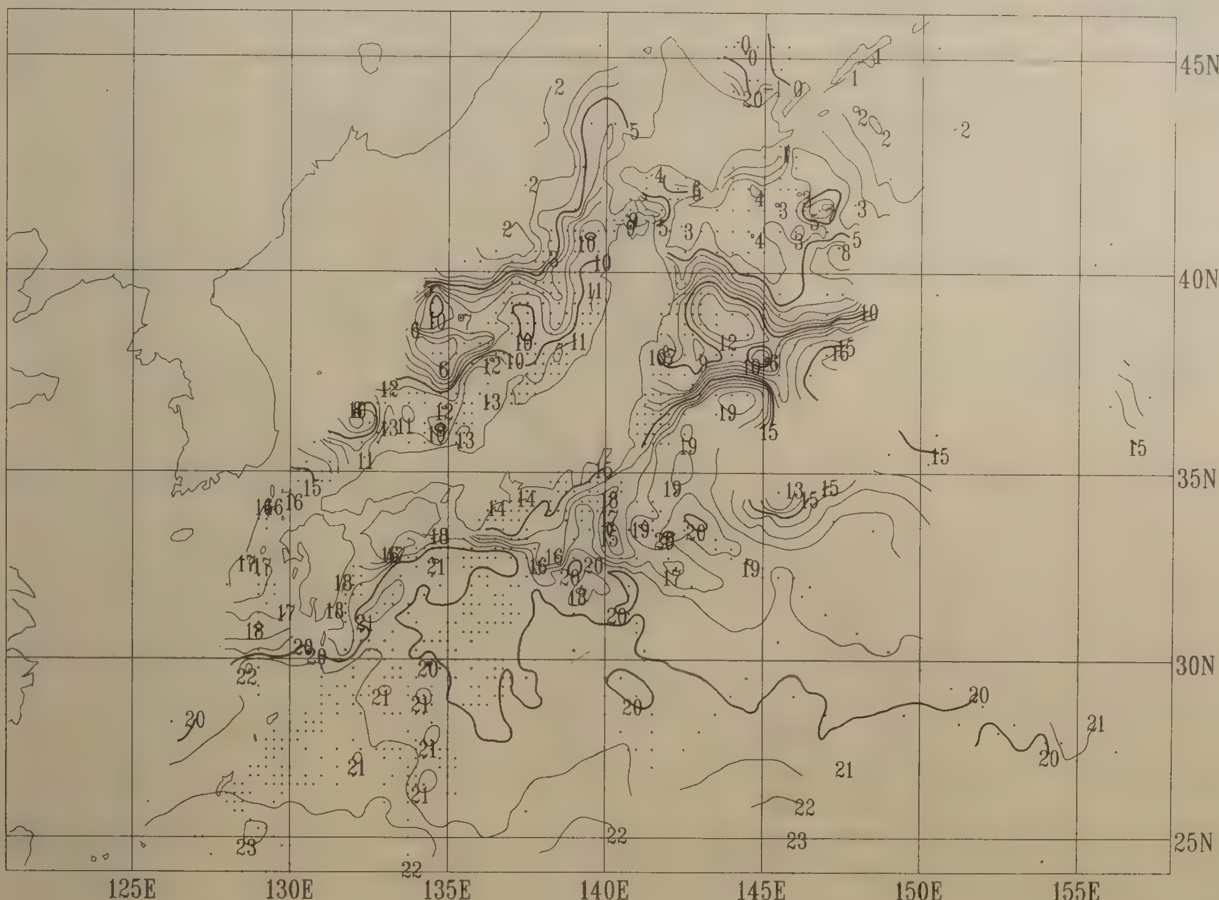
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 2月下旬)

Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in FEB 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



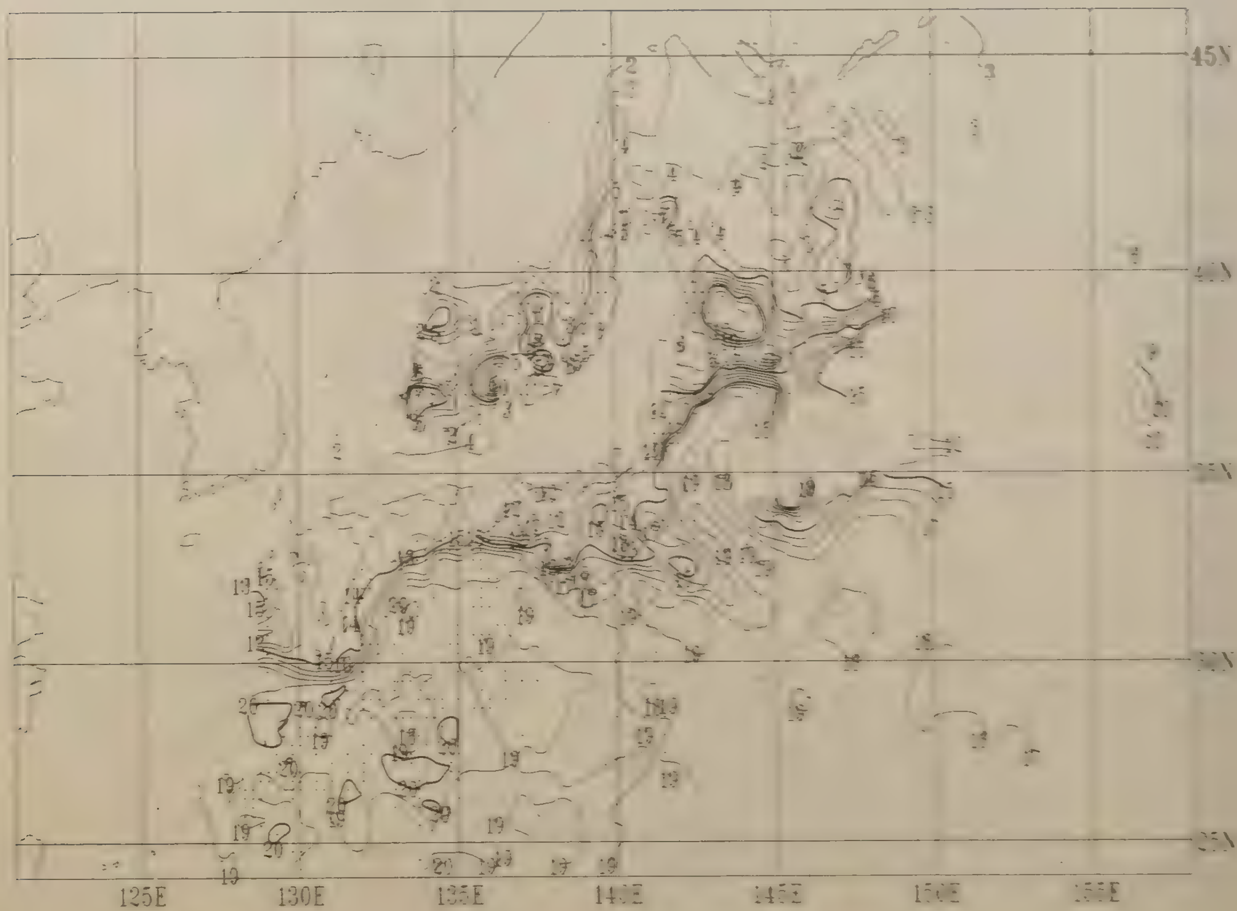
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1999年 2月)

Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for FEB 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第5図　日本近海表層水温図(深さ100 m)(1999年 2月)

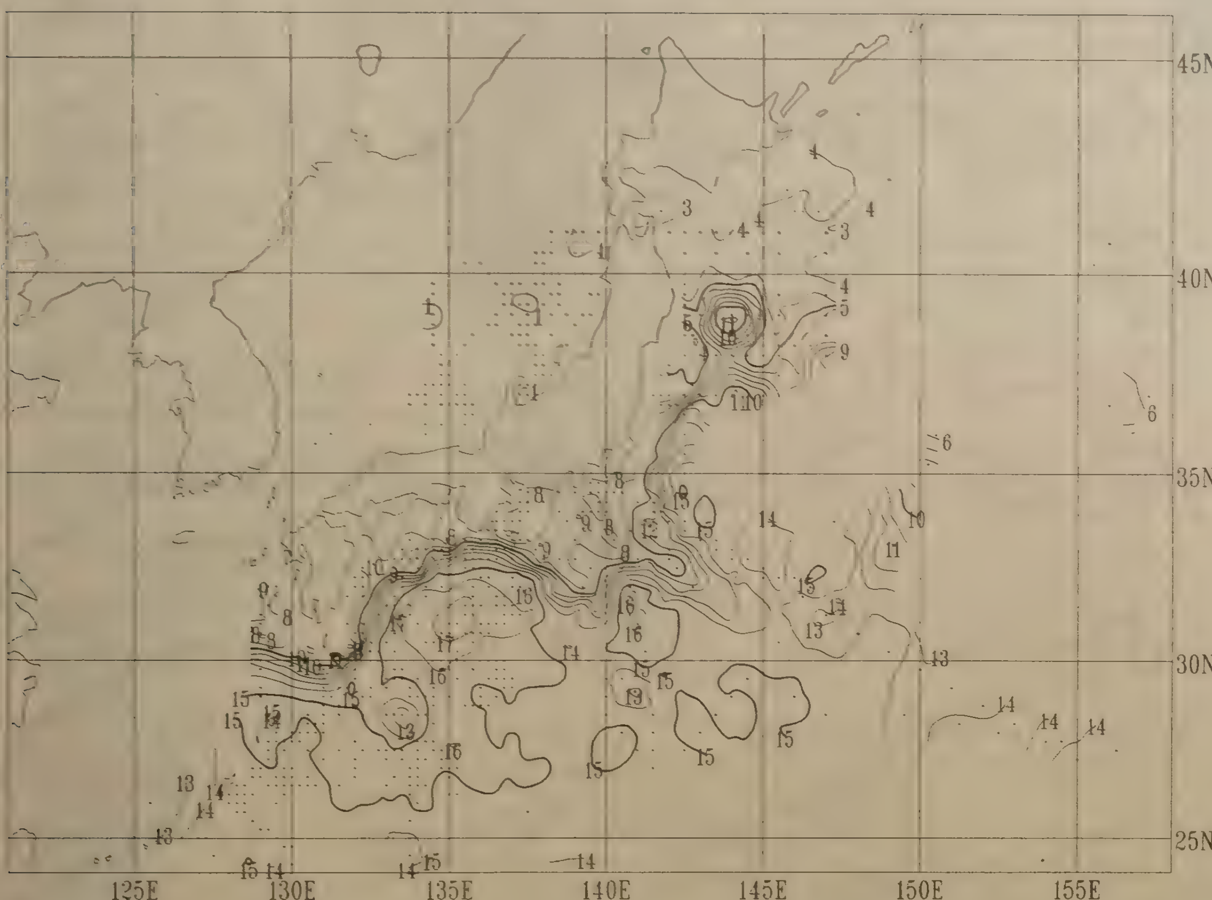
Fig.5 Subsurface (100 m) temperatures in the seas adjacent to Japan for FEB 1999. Contour interval is 1°C. Observation points are denoted by dots.



第6図　日本近海表層水温図(深さ200 m) (1999年 2月)

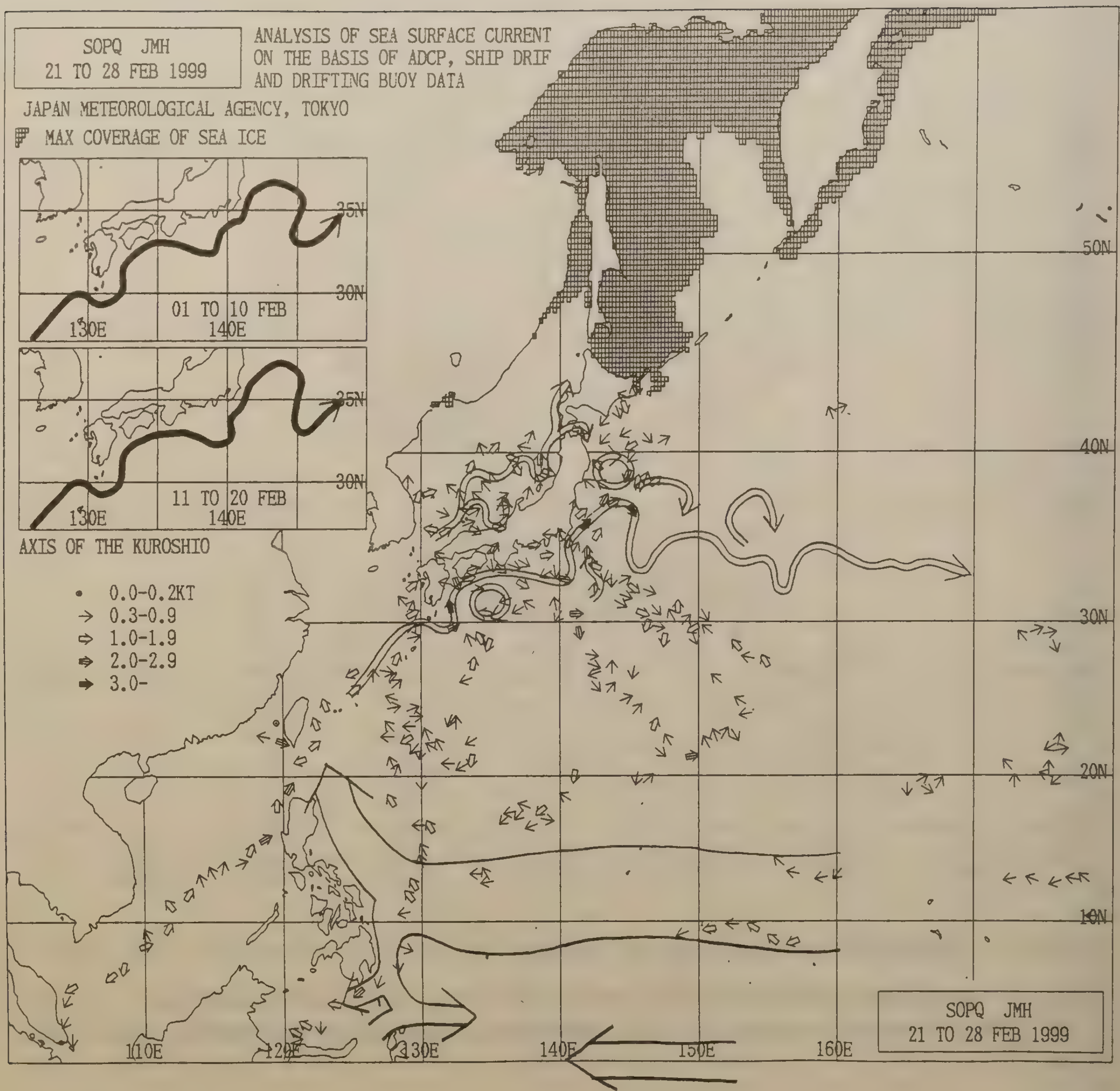
Fig.6 Subsurface (200 m) temperatures in the seas adjacent to Japan for FEB 1999. Contour interval is 1°C. Observation points are denoted by dots.

400m Temperatures in the Seas Adjacent to Japan



第7図　日本近海表層水温図(深さ400 m) (1999年 2月)

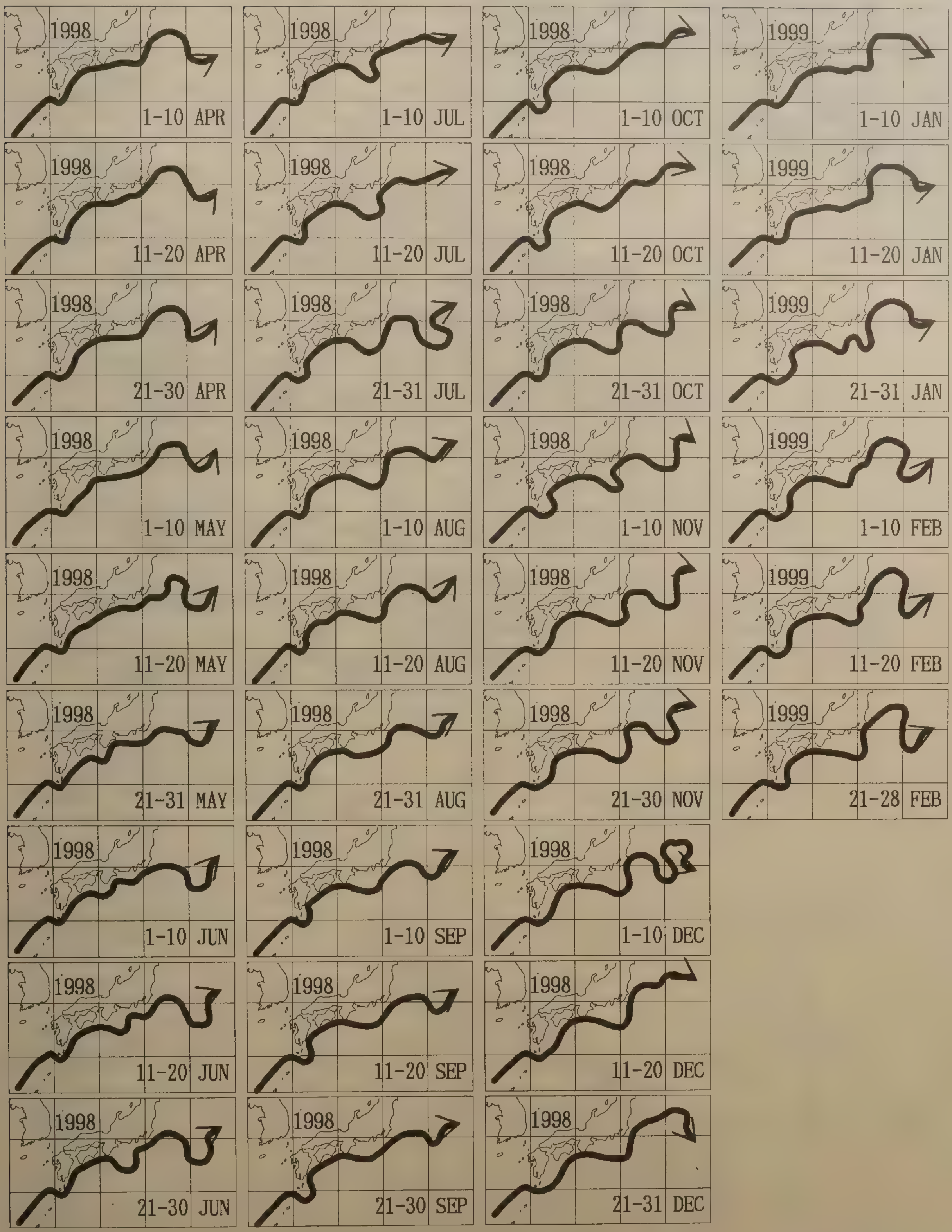
Fig.7 Subsurface (400 m) temperatures in the seas adjacent to Japan for FEB 1999. Contour interval is 1°C. Observation points are denoted by dots.



第 8 図　北西太平洋海流図（1999 年 2 月下旬）

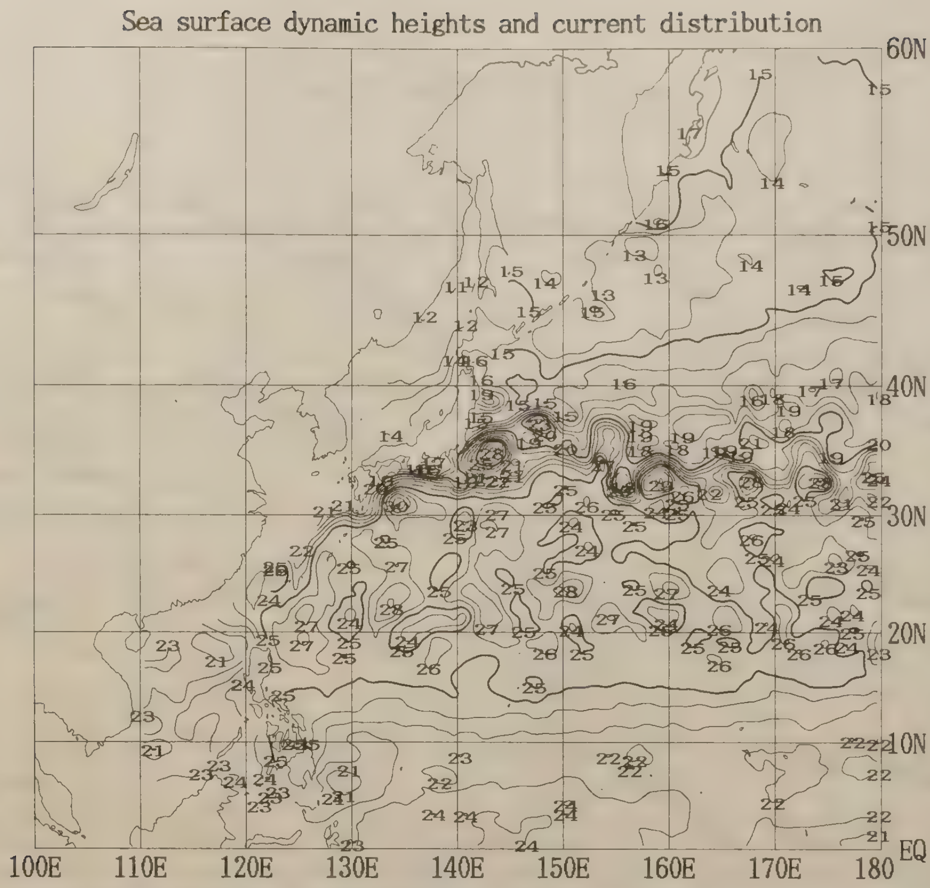
Fig.8　Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in February 1999. Small arrows indicate *in situ* observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

Location of the Kuroshio axis



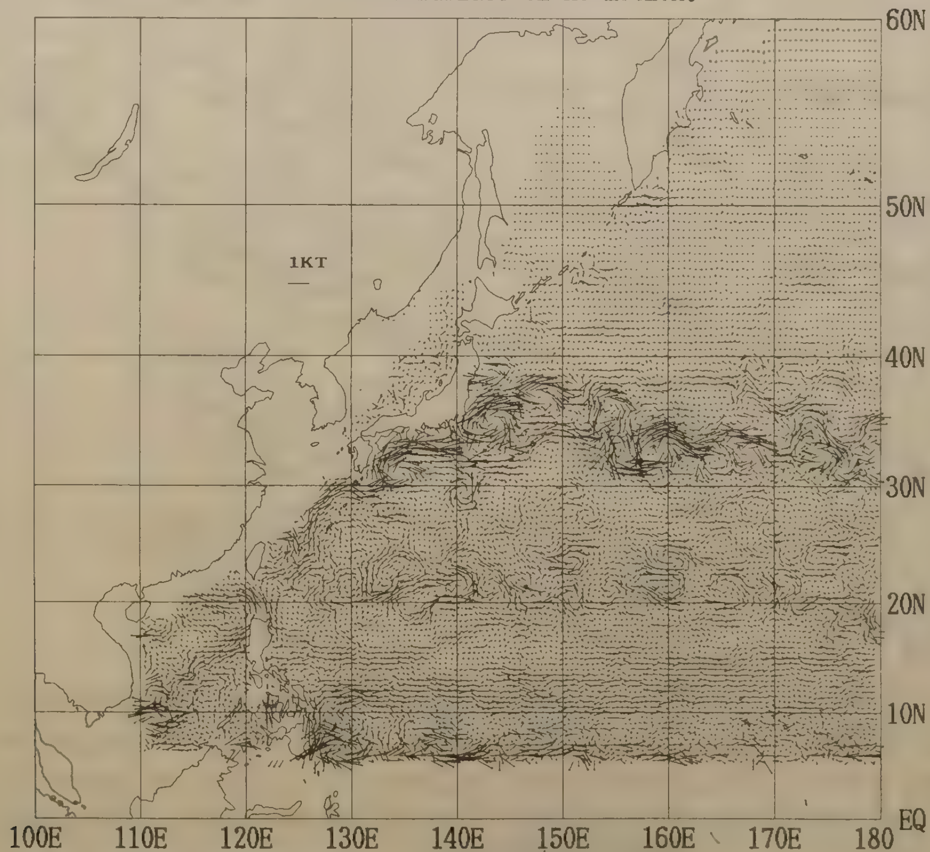
第9図 旬別黒潮流軸図

Fig.9 Location of the Kuroshio axis



第10図 北西太平洋力学的海面高度分布図(1999年 2月14日)

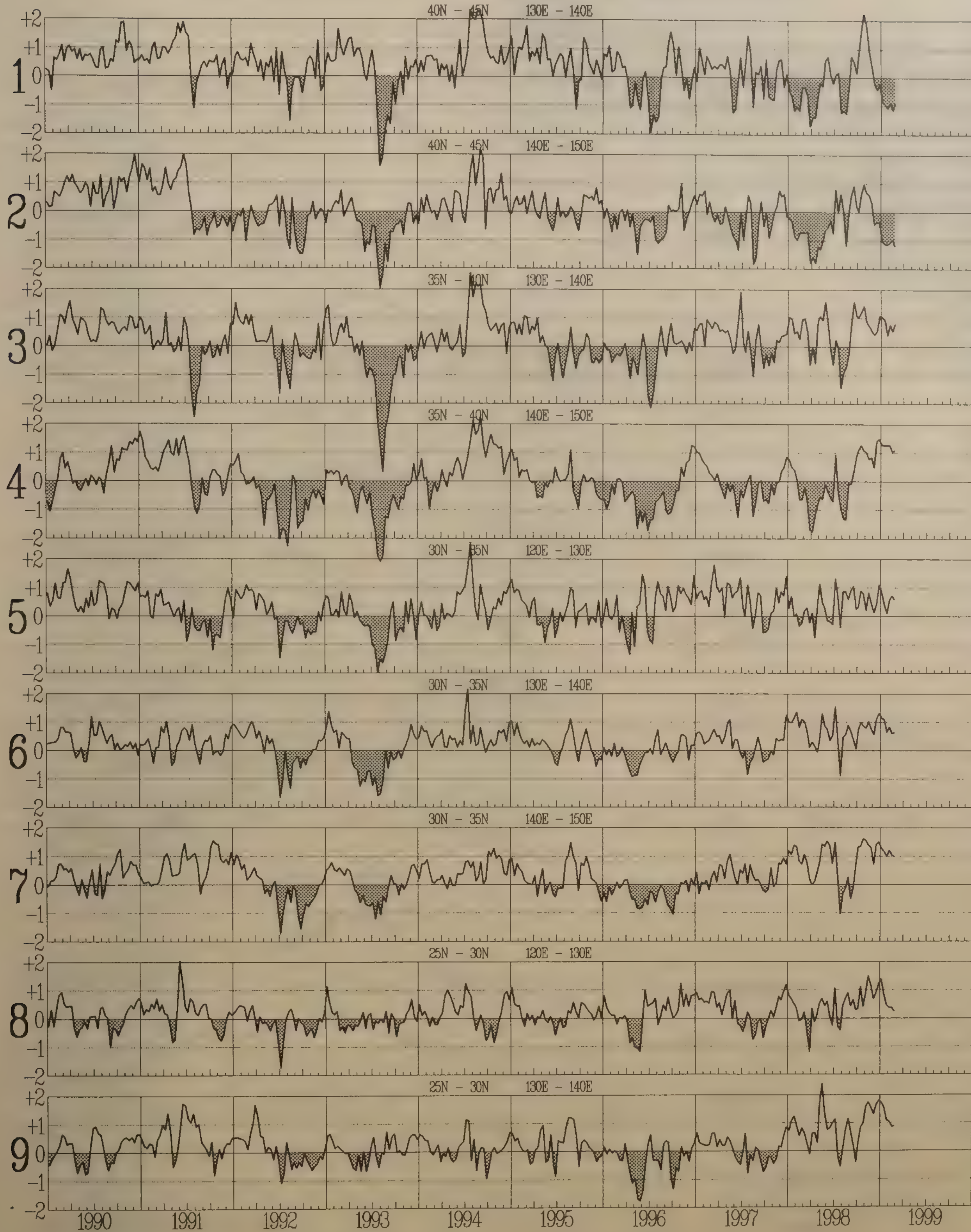
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (FEB 14, 1999).
1500db surface is assumed to be the surface of no motion.

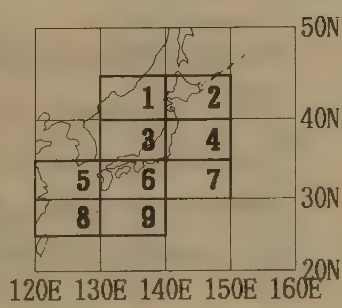


第11図 北西太平洋海流ベクトル図(1999年 2月14日)

Fig.11 Sea surface current vectors in the western North Pacific (FEB 14, 1999). Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

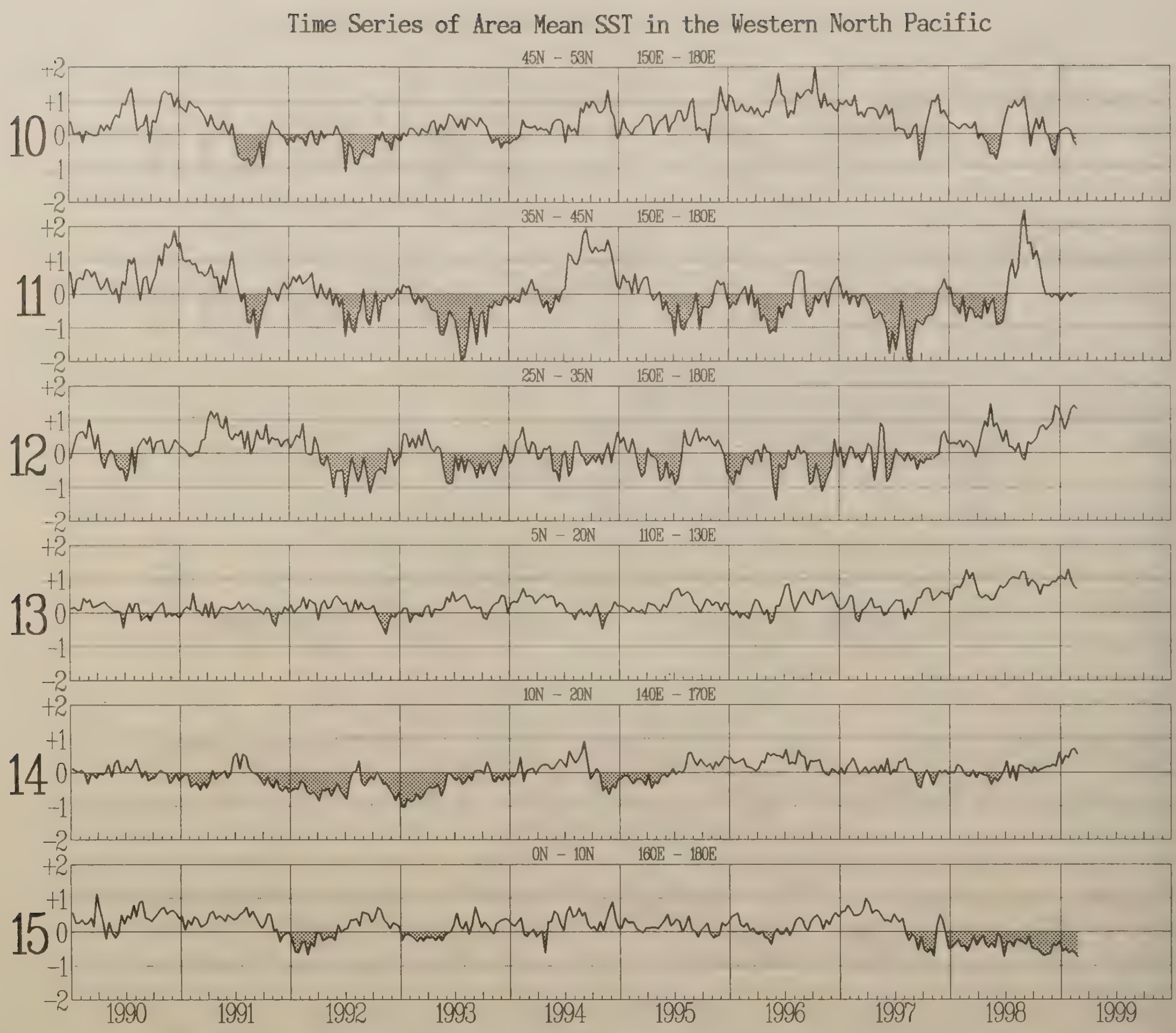
Time Series of Area Mean SST in the Western North Pacific

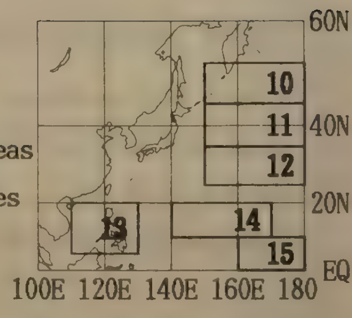




第12図　海域別旬平均海面水温平年偏差時系列図

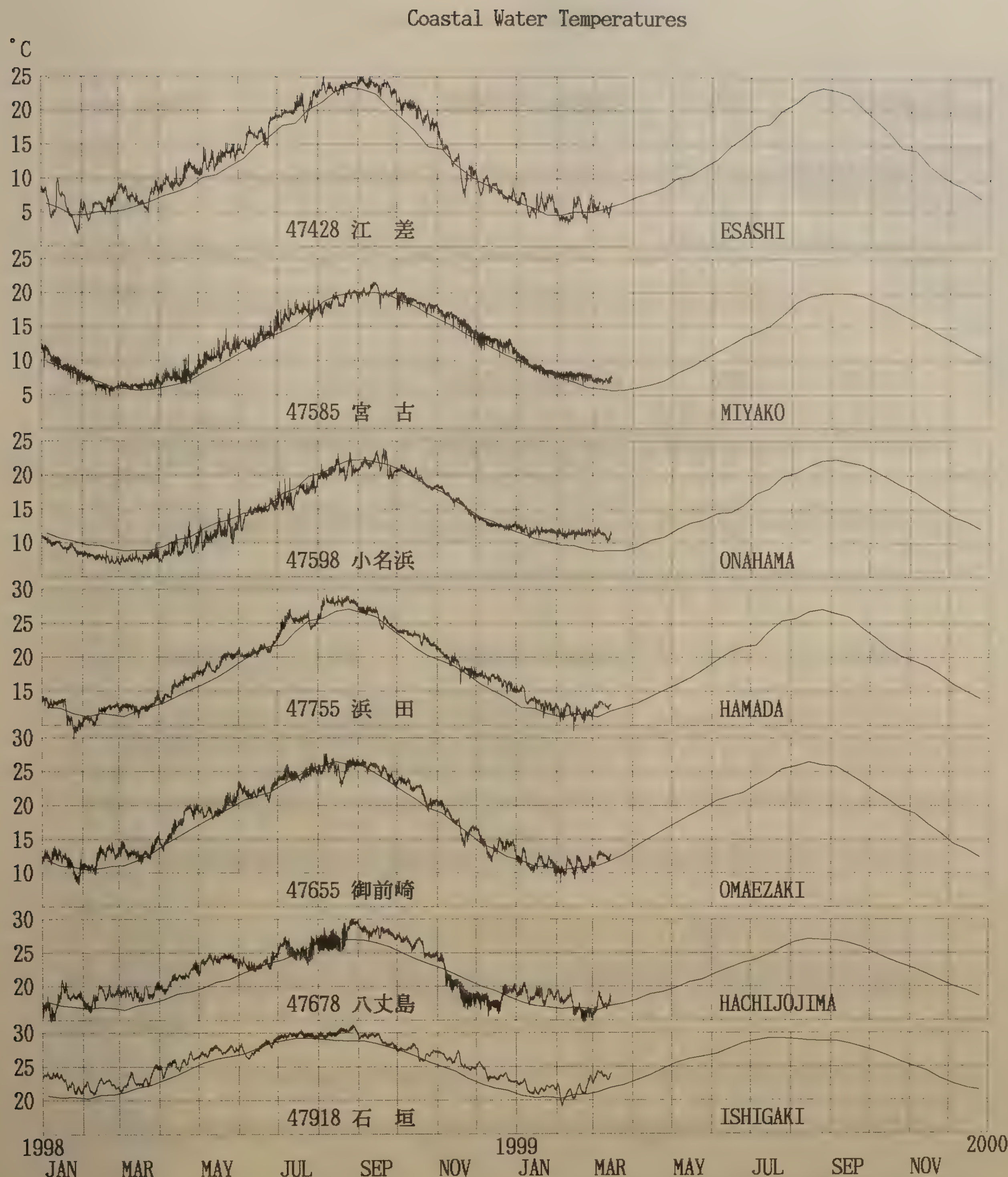
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

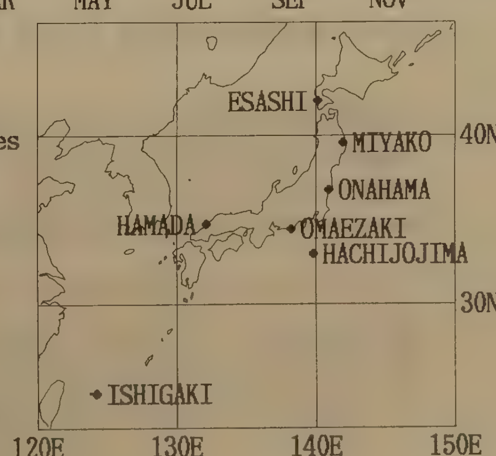




第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

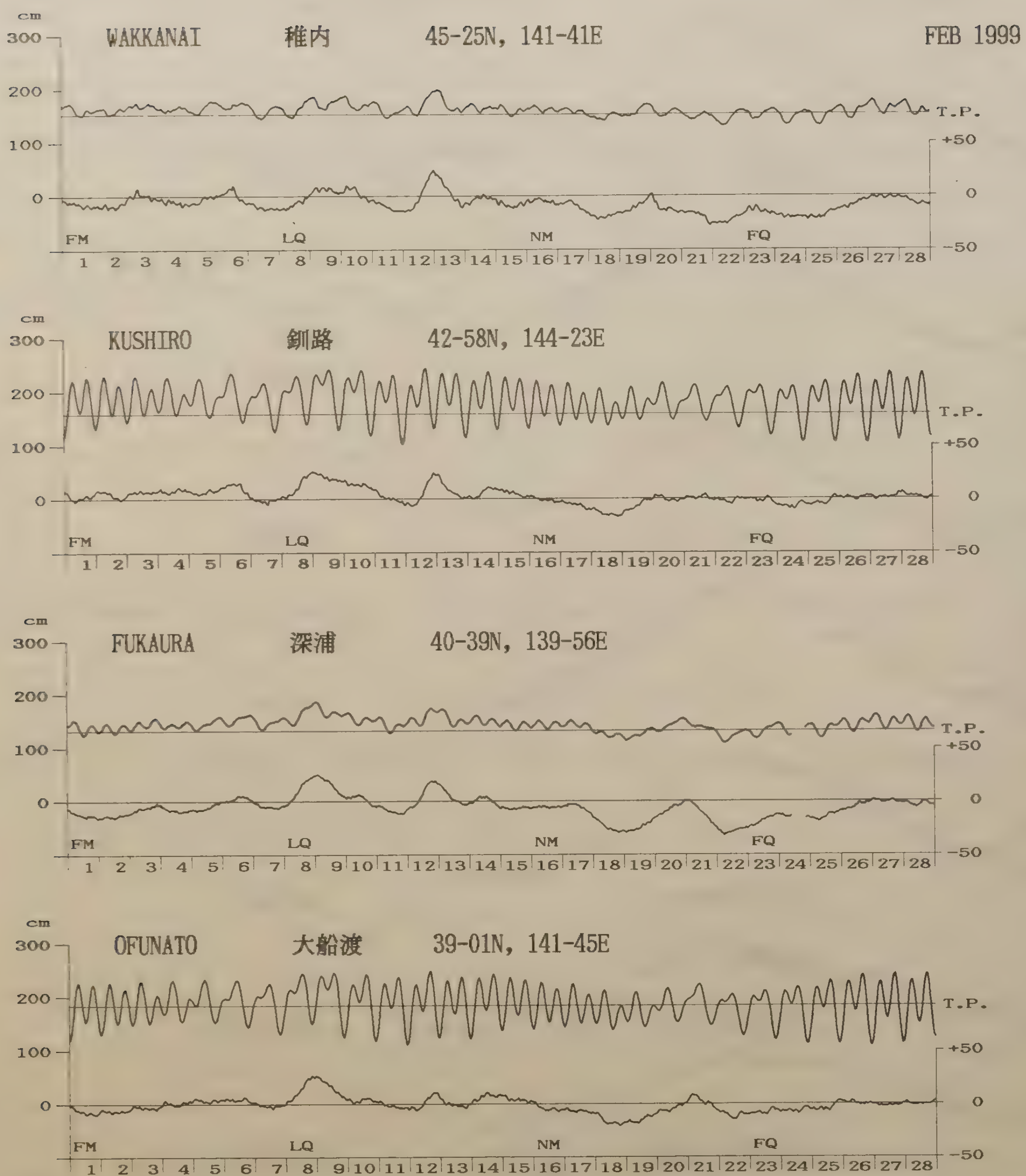
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).





第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.



第14図 沿岸潮位時系列図（1999年 2月）

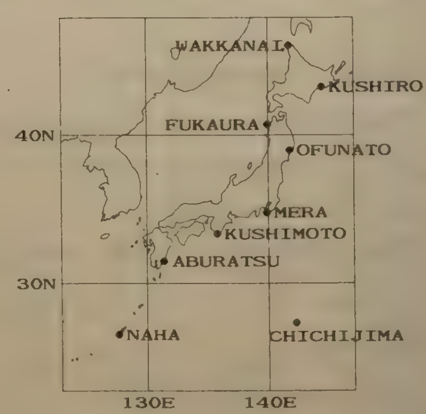
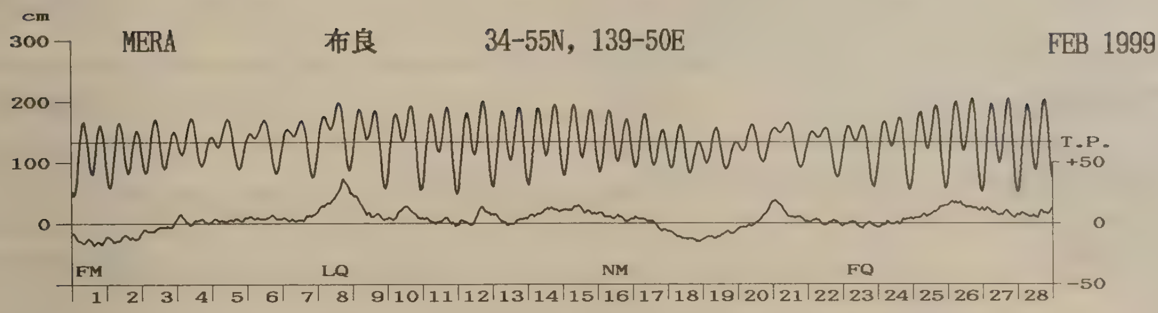
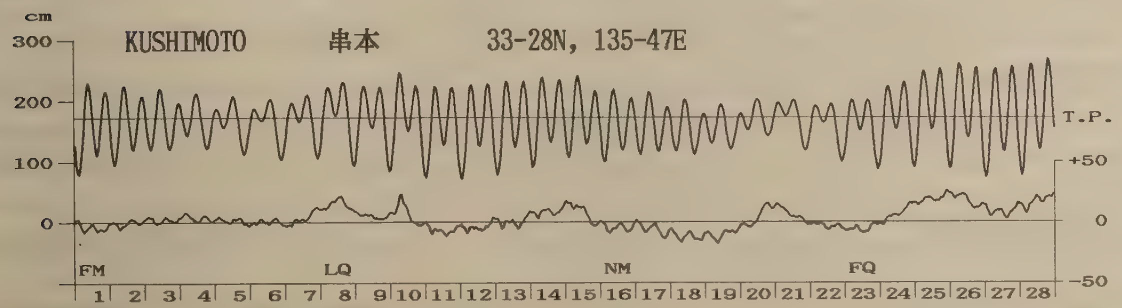
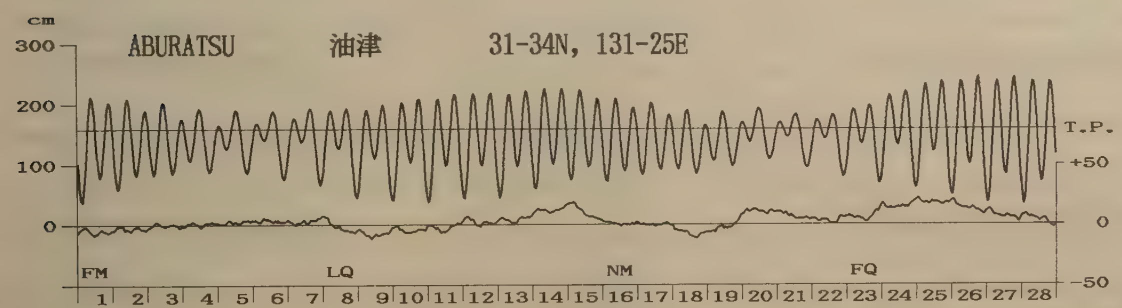


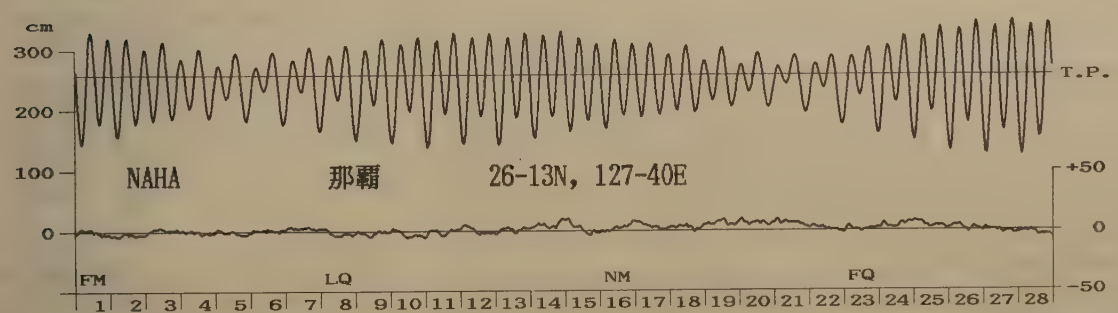
Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

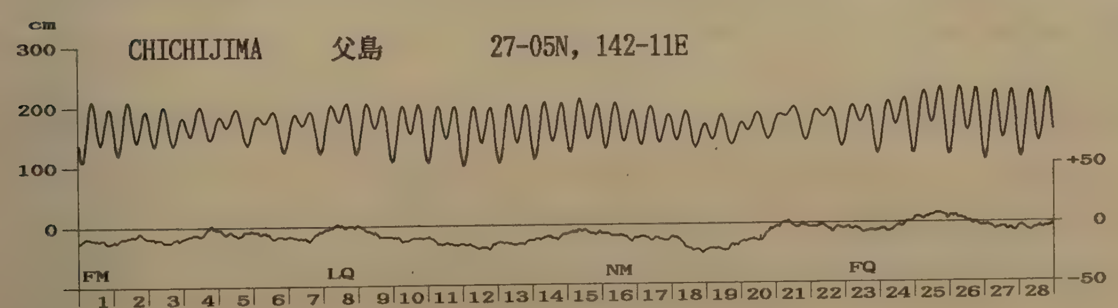
NM: new moon, FQ: first quarter
FM: full moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)





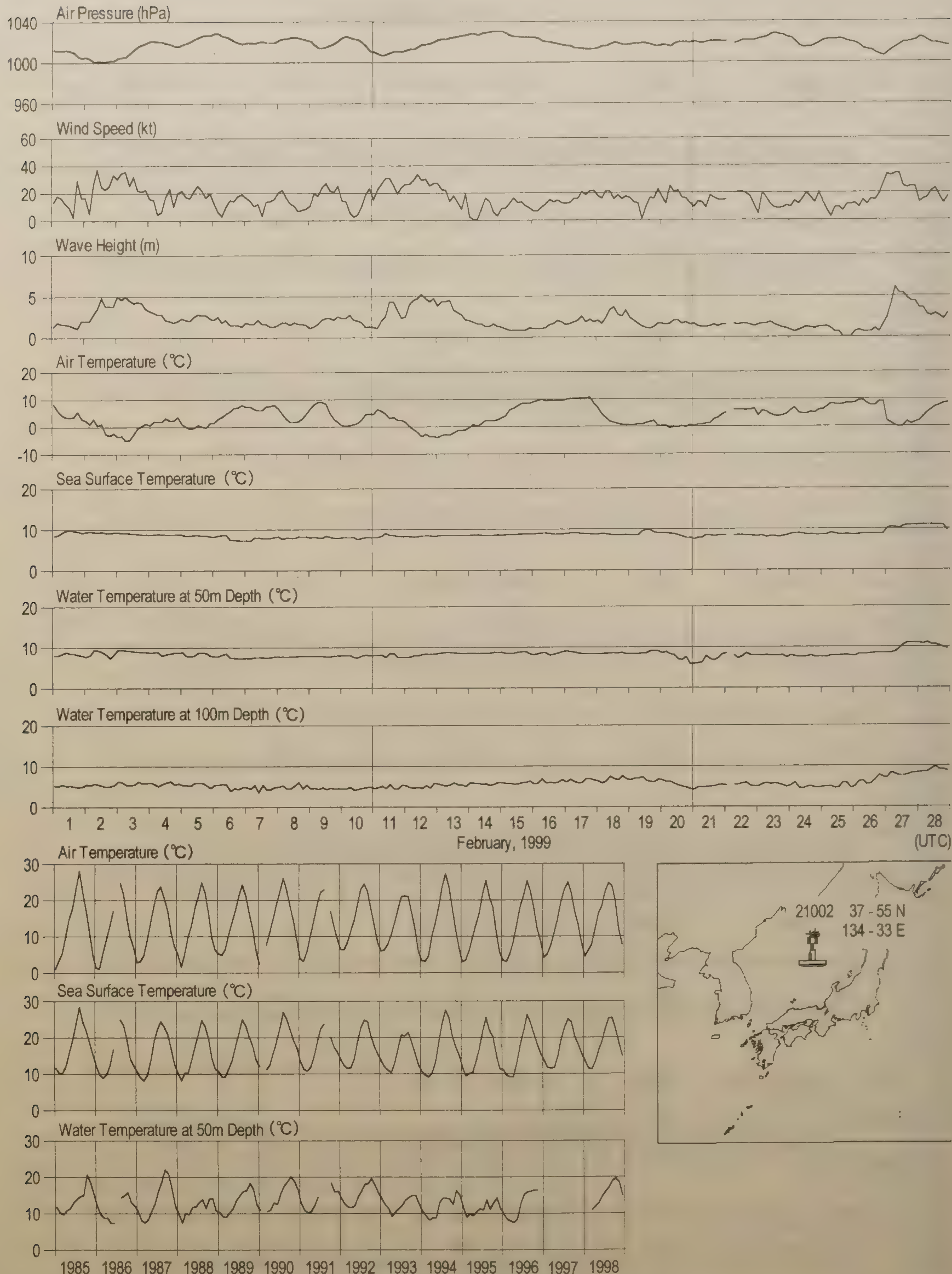






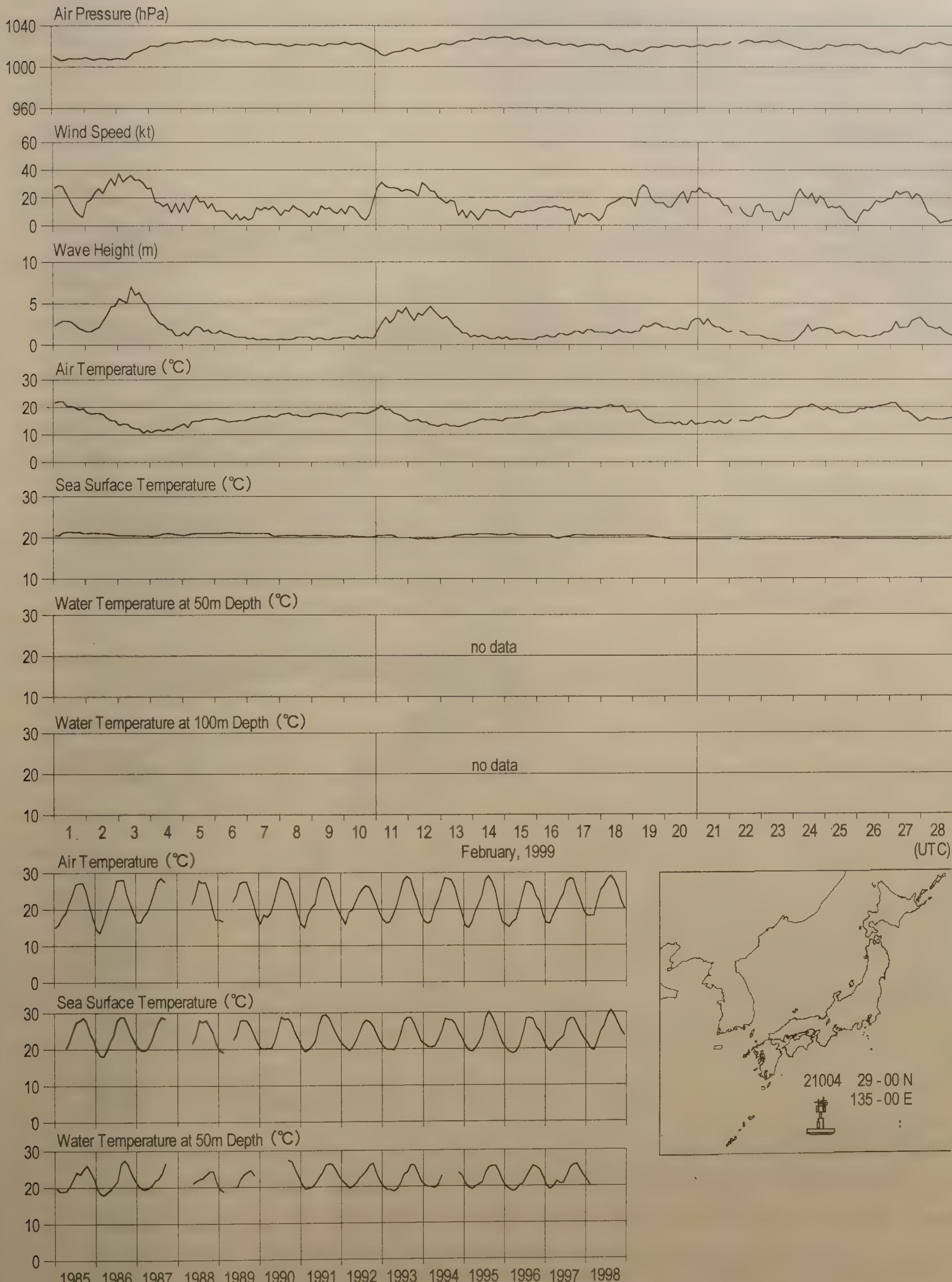
第14図 つづき
Fig.14 continue

Ocean Data Buoy Observations



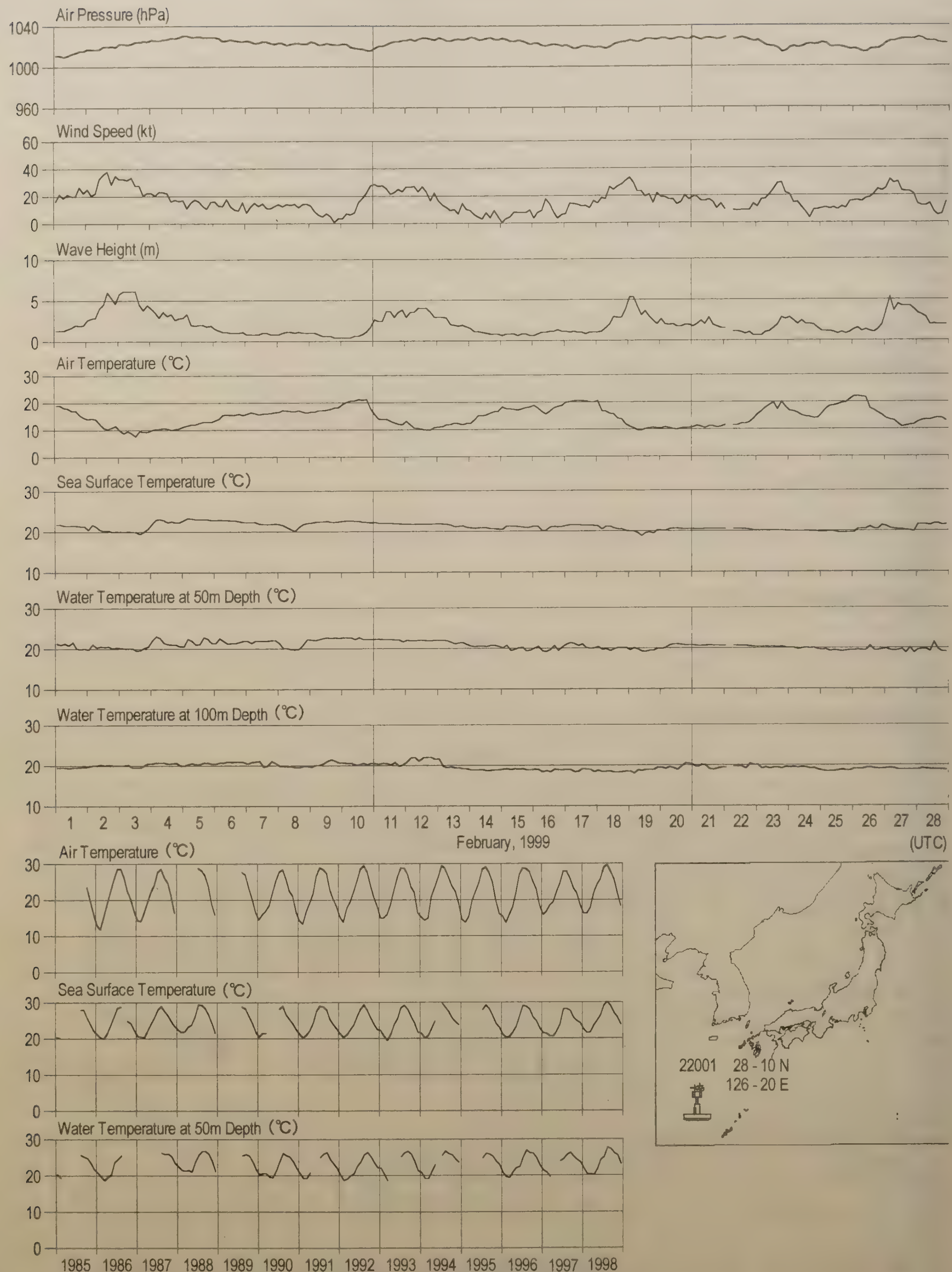
第15図　　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig.15　　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

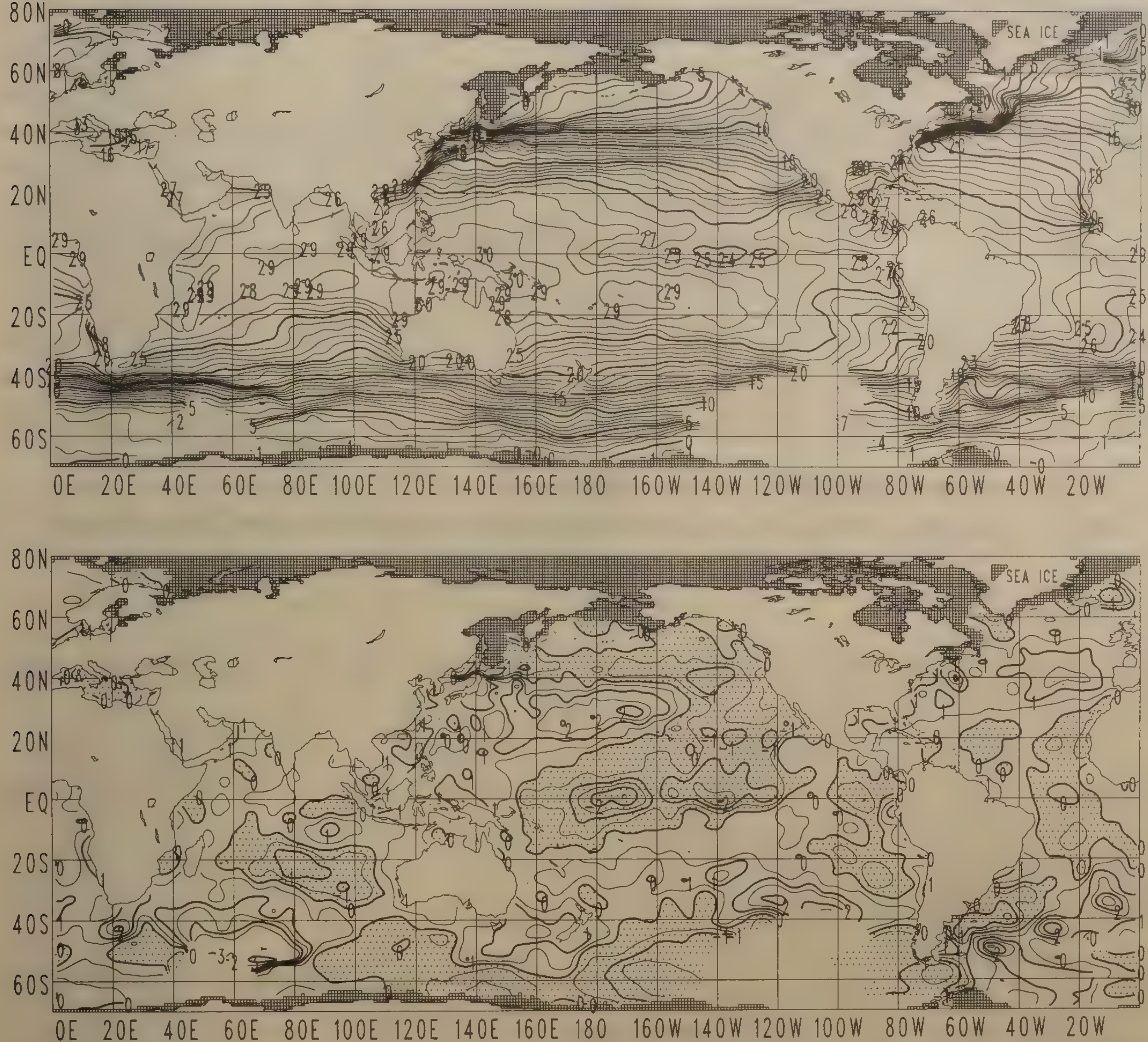
Fig.15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig.15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

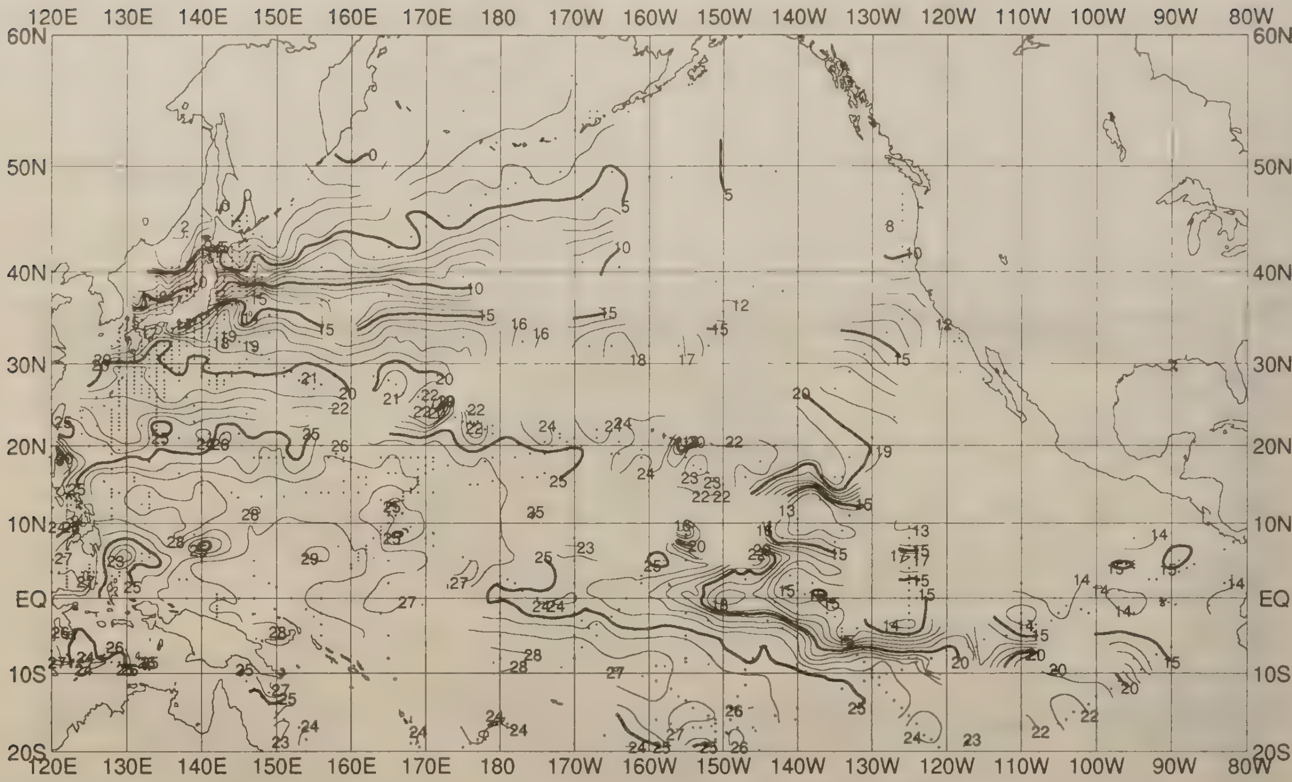
SST & Anomalies in the Global Ocean



第16図　全球月平均海面水温図（上）及び偏差図（下）（1999年 2月）

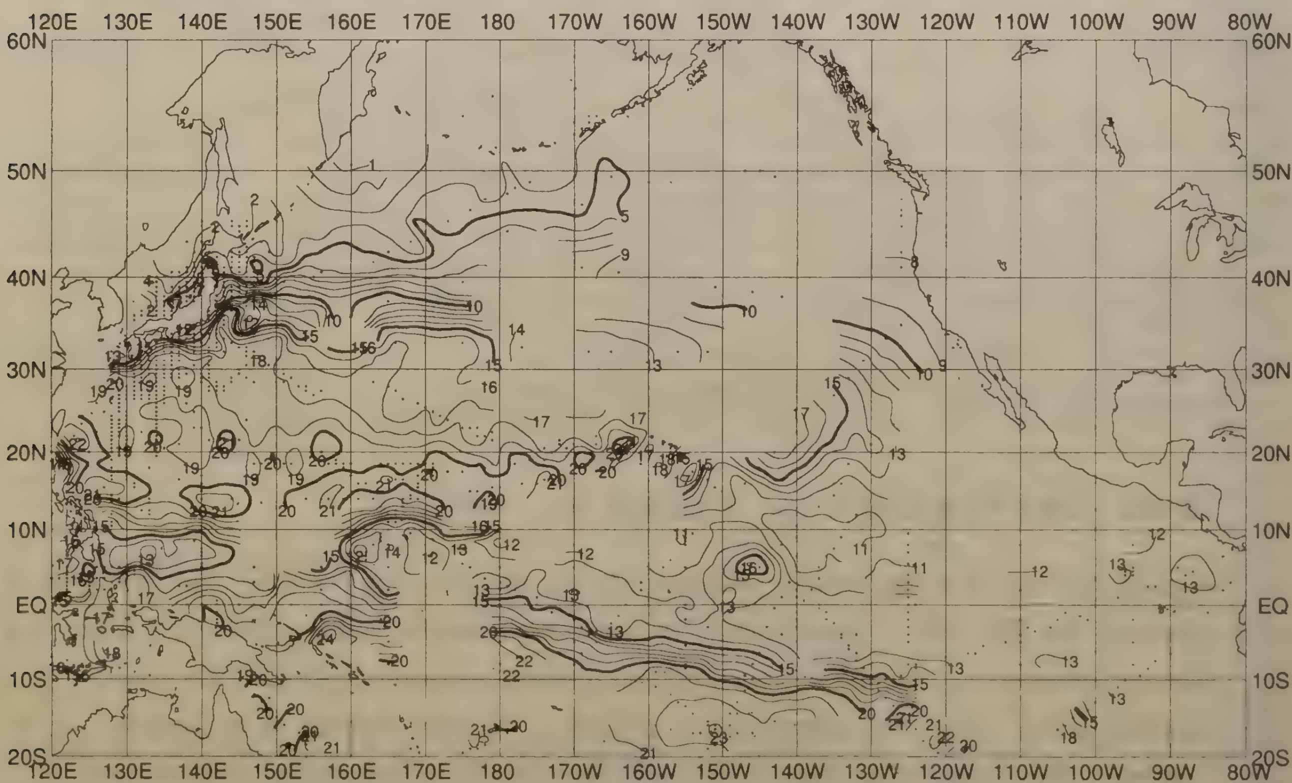
Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for FEB 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).

100m/200m Temperatures in the Pacific Ocean



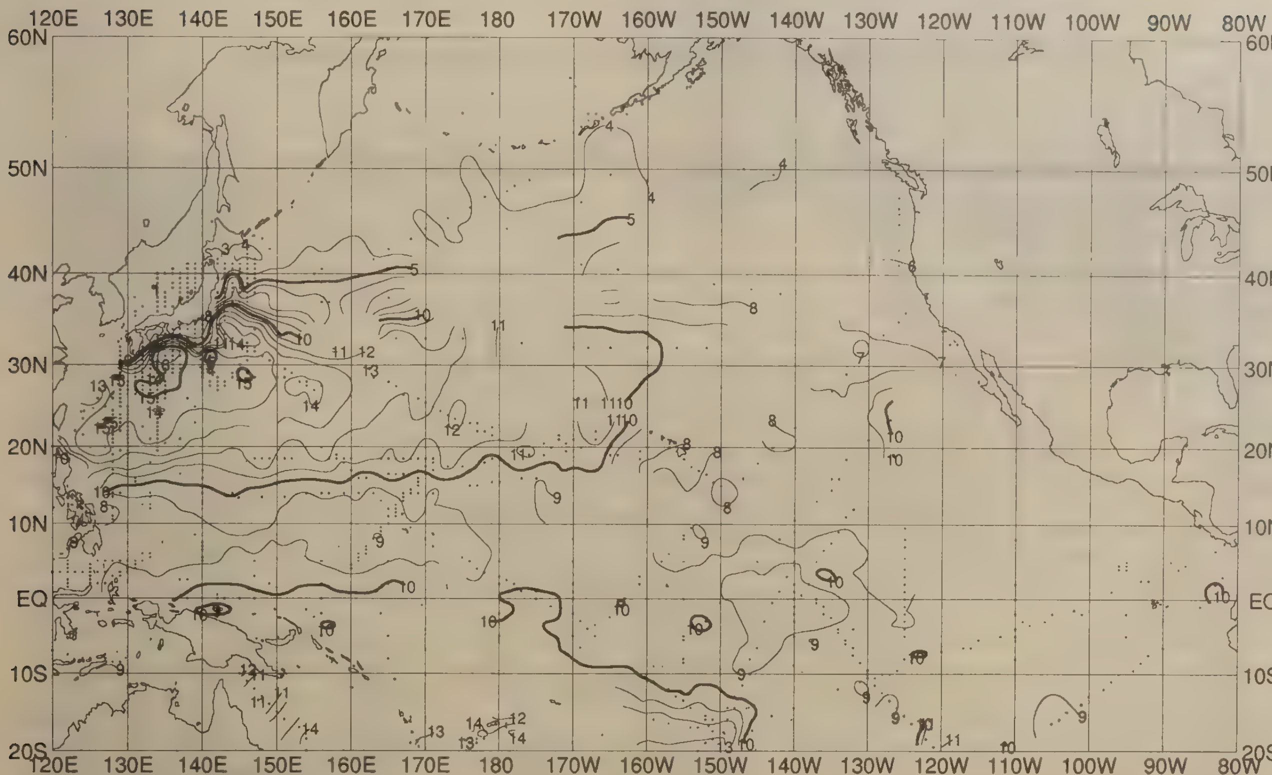
第 17 図　太平洋表層水温図（深さ 100 m）（1999 年 2 月）

Fig.17　Subsurface (100 m) temperatures in the Pacific Ocean for February 1999. Contour interval is 1 ℃. Observation points are denoted by dots.



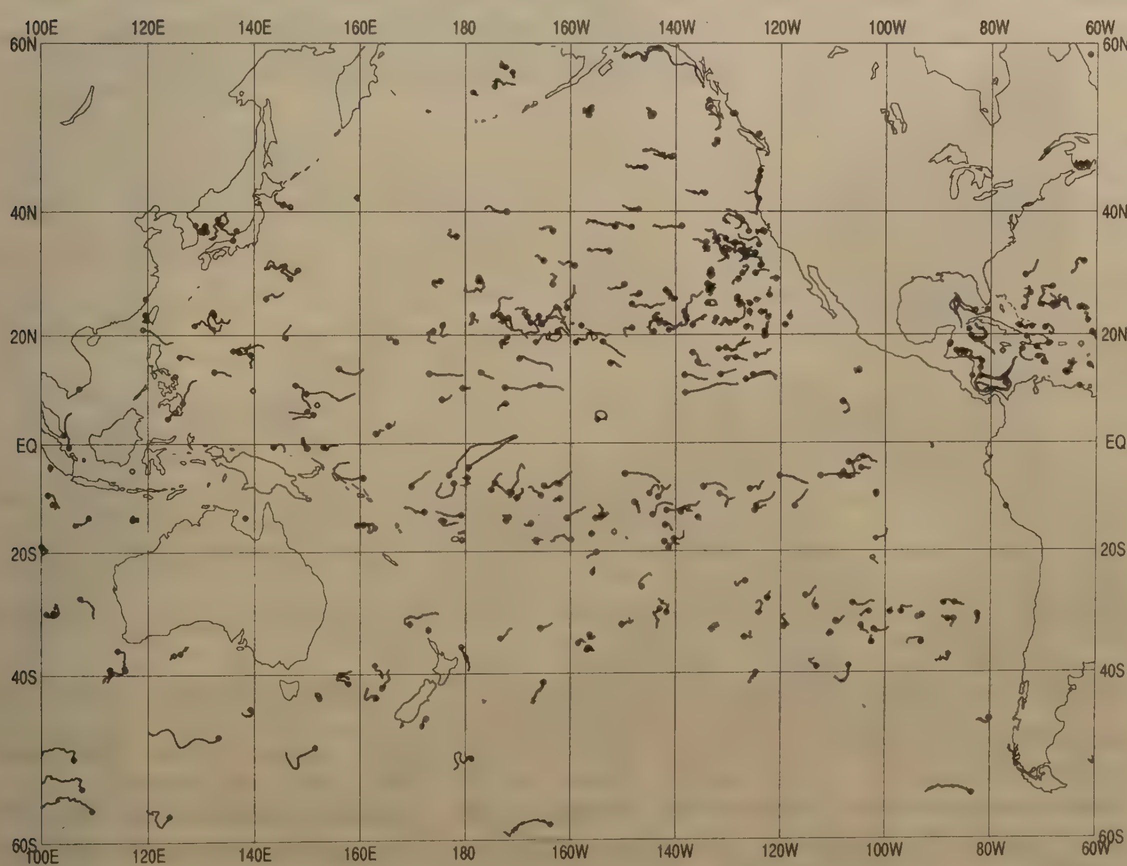
第 18 図　太平洋表層水温図（深さ 200 m）（1999 年 2 月）

Fig.18　Subsurface (200 m) temperatures in the Pacific Ocean for February 1999. Contour interval is 1 ℃. Observation points are denoted by dots.



第 19 図　太平洋表層水温図（深さ 400 m）（1999 年 2 月）

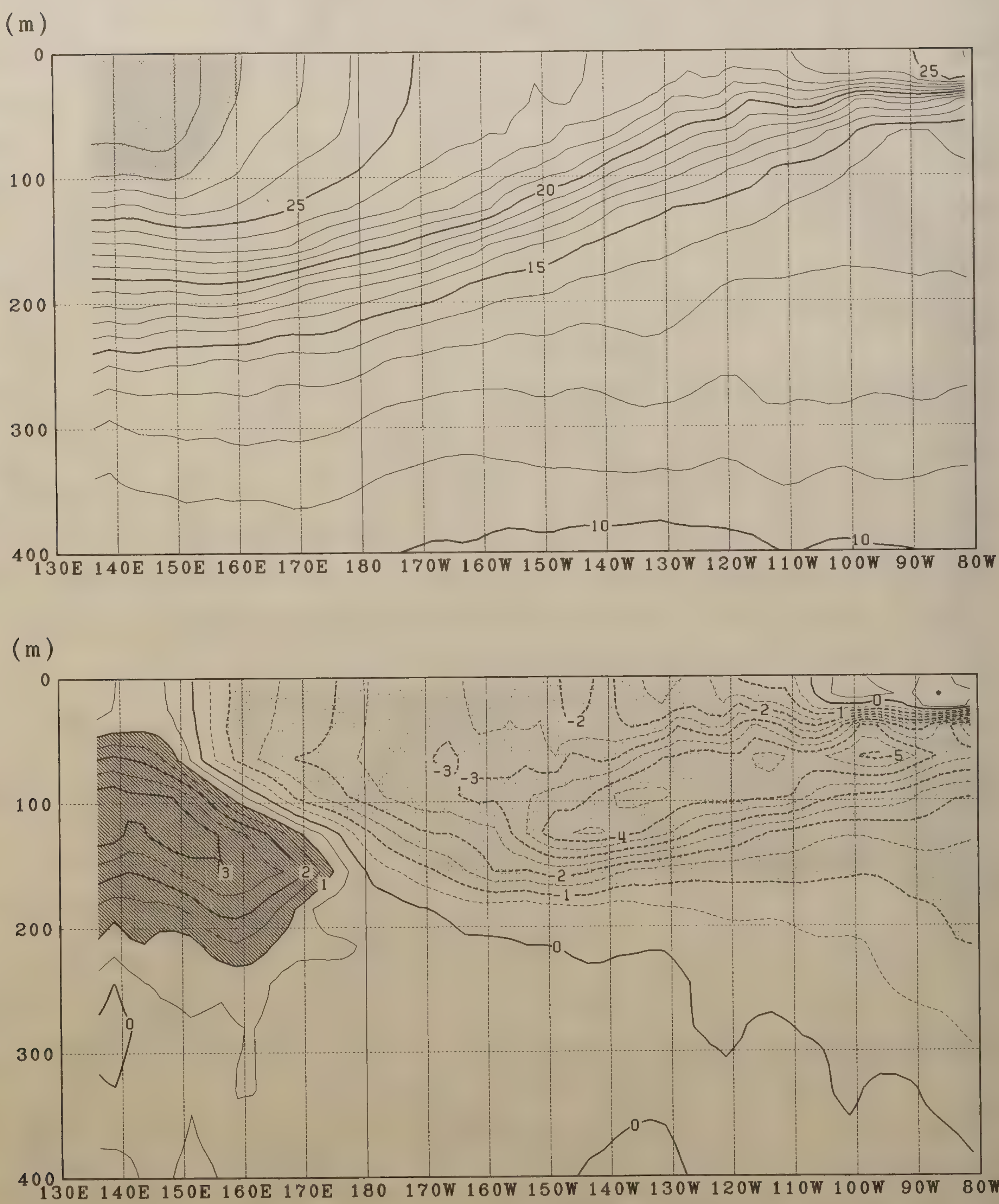
Fig.19　Subsurface (400 m) temperatures in the Pacific Ocean for February 1999. Contour interval is 1 ℃. Observation points are denoted by dots.



第 20 図　太平洋ブイ流跡図（1999 年 2 月）

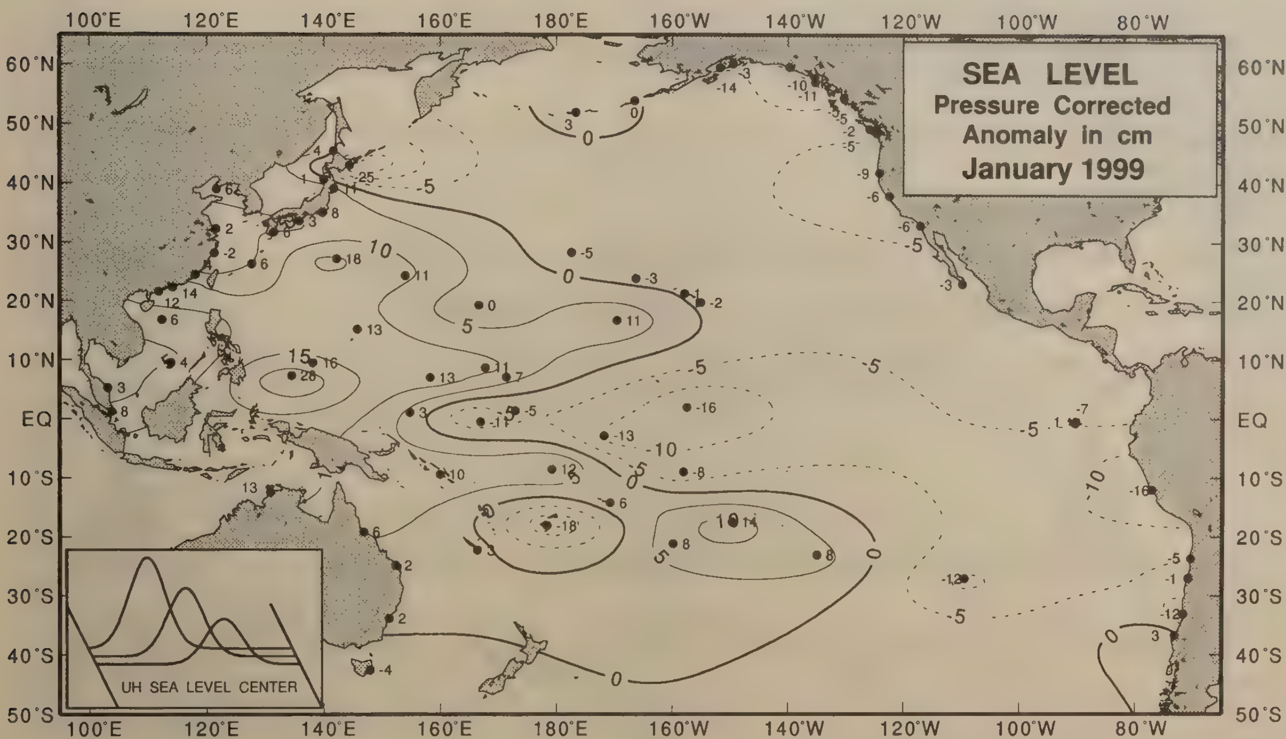
Fig.20　Movements of drifting buoys in the Pacific Ocean during February 1999. Each track is for one buoy. Small circles represent the last positions for the month.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



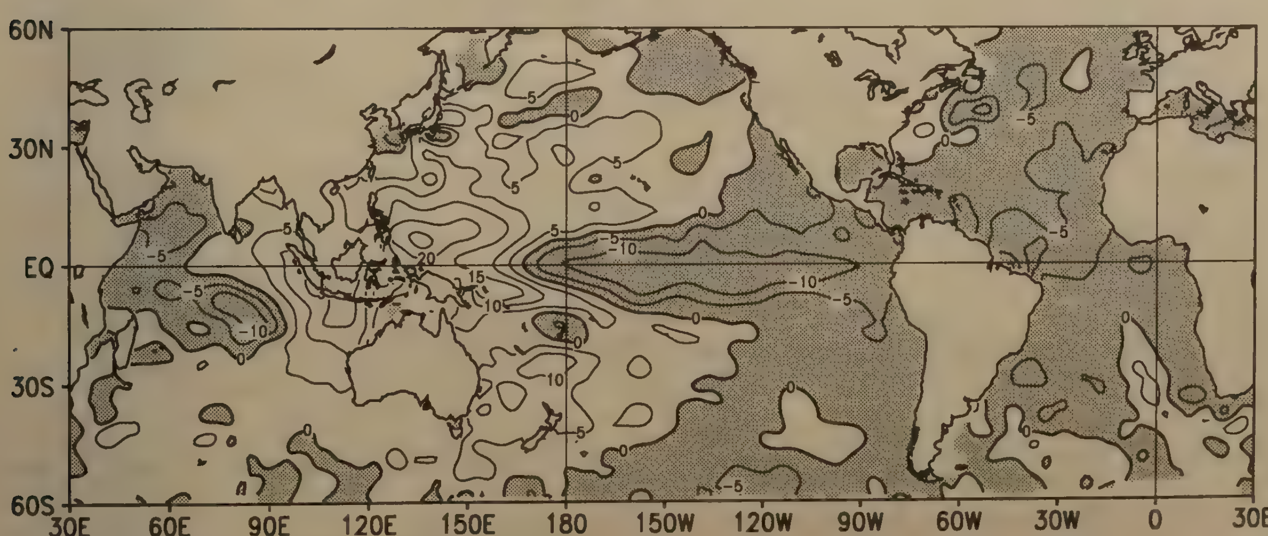
第21図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1999年 2月）

Fig.21 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for FEB 1999. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1997 base period means.



第 22 図　太平洋月平均海面水位偏差図（1999 年 1 月）

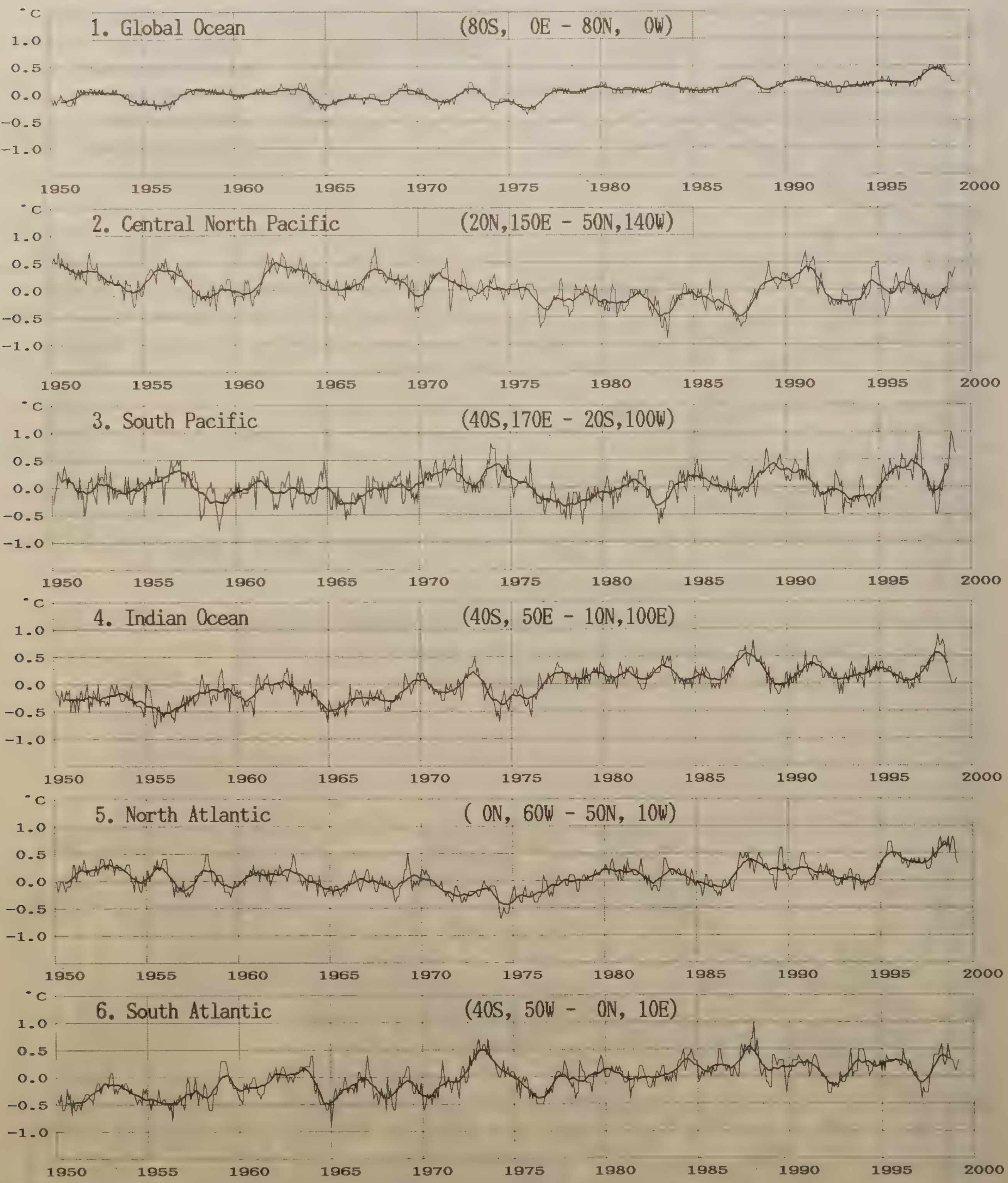
Fig. 22　Monthly sea level anomalies for January 1999 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Department of Oceanography, University of Hawaii.



第 23 図　全球月平均海面高度偏差図（1999 年 1 月）

Fig. 23　Monthly sea surface height anomalies in the global ocean derived from the altimeter data of TOPEX/POSEIDON for January 1999. Contour interval is 5 cm. Negative anomalies are spotted. Anomalies are computed from 1993-1996 base period means.

Long-term Variation of Monthly Mean SST Anomalies

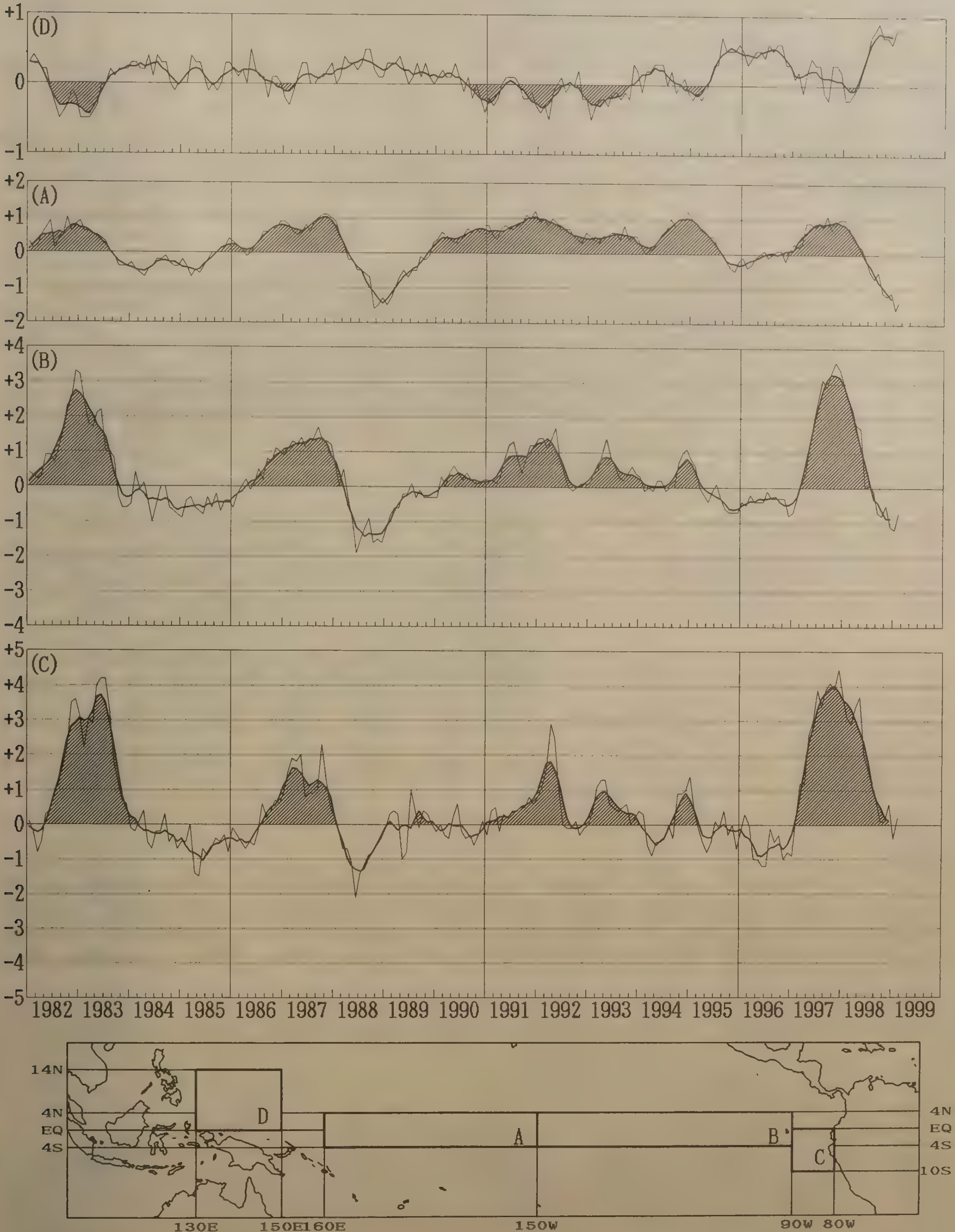


第24図 海域平均海面水温偏差の長期変動

Fig.24 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.



Time Series of Equatorial Pacific SST Anomalies



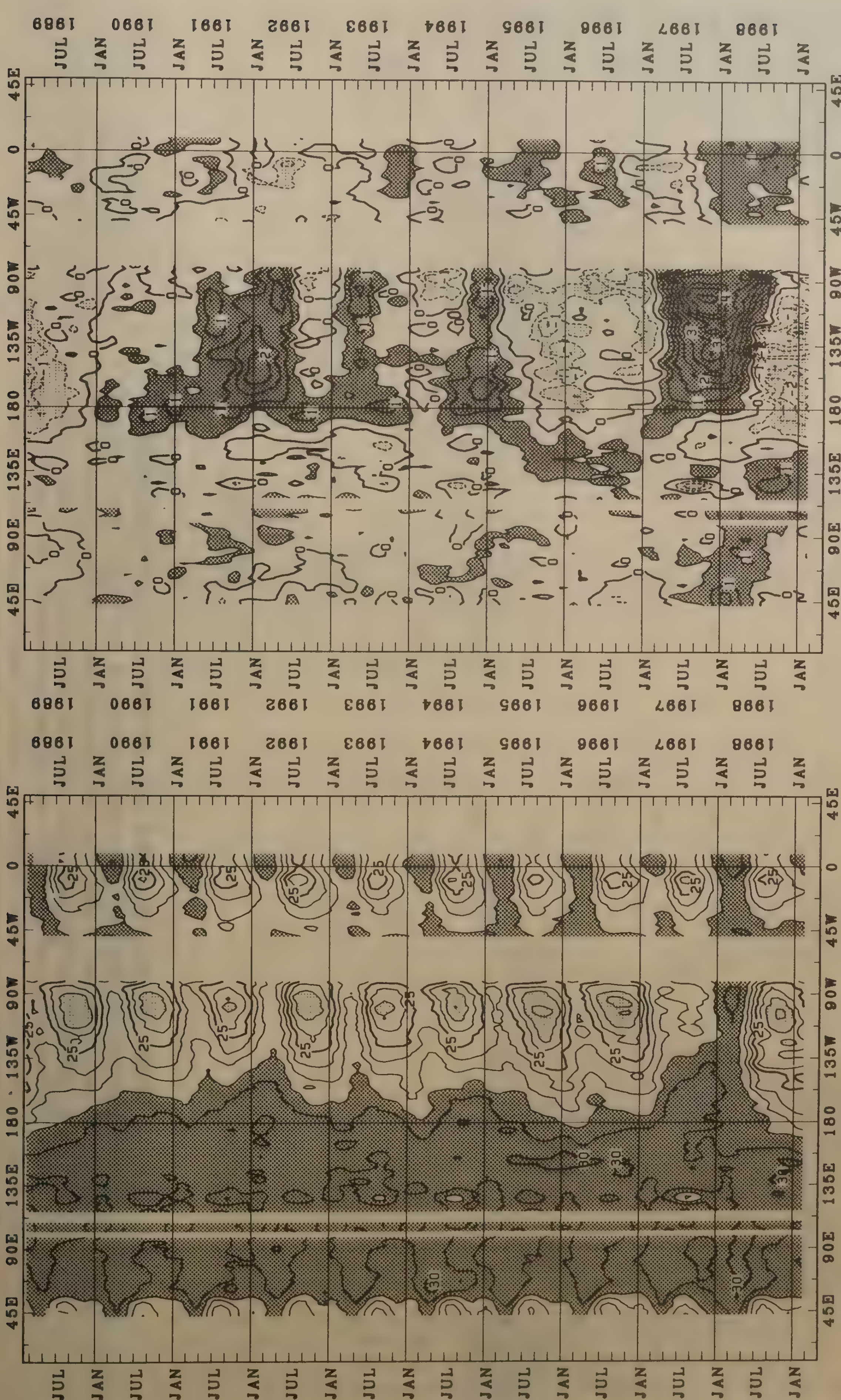
第25図　太平洋赤道域の海面水温偏差時系列図

Fig.25 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

	SEA SURFACE TEMPERATURE AND ANOMALY (°C)								SOI	SEA LEVEL PRESSURE ANOMALY (hPa)	
MONTH	REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1
NOV 98	29.9	0.7	27.2	-1.2	24.1	-0.5	21.6	0.1	1.0	0.4	-1.5
DEC 98	29.5	0.6	27.1	-1.1	23.8	-1.1	23.2	0.6	1.5	1.1	-1.5
JAN 99	29.3	0.8	26.4	-1.6	24.2	-1.2	23.9	-0.4	1.5	1.8	-1.5
FEB 99	29.1	0.8	26.7	-1.3	25.5	-0.7	25.9	0.2	0.8	1.3	-0.6

第1表　エルニーニョ監視指数

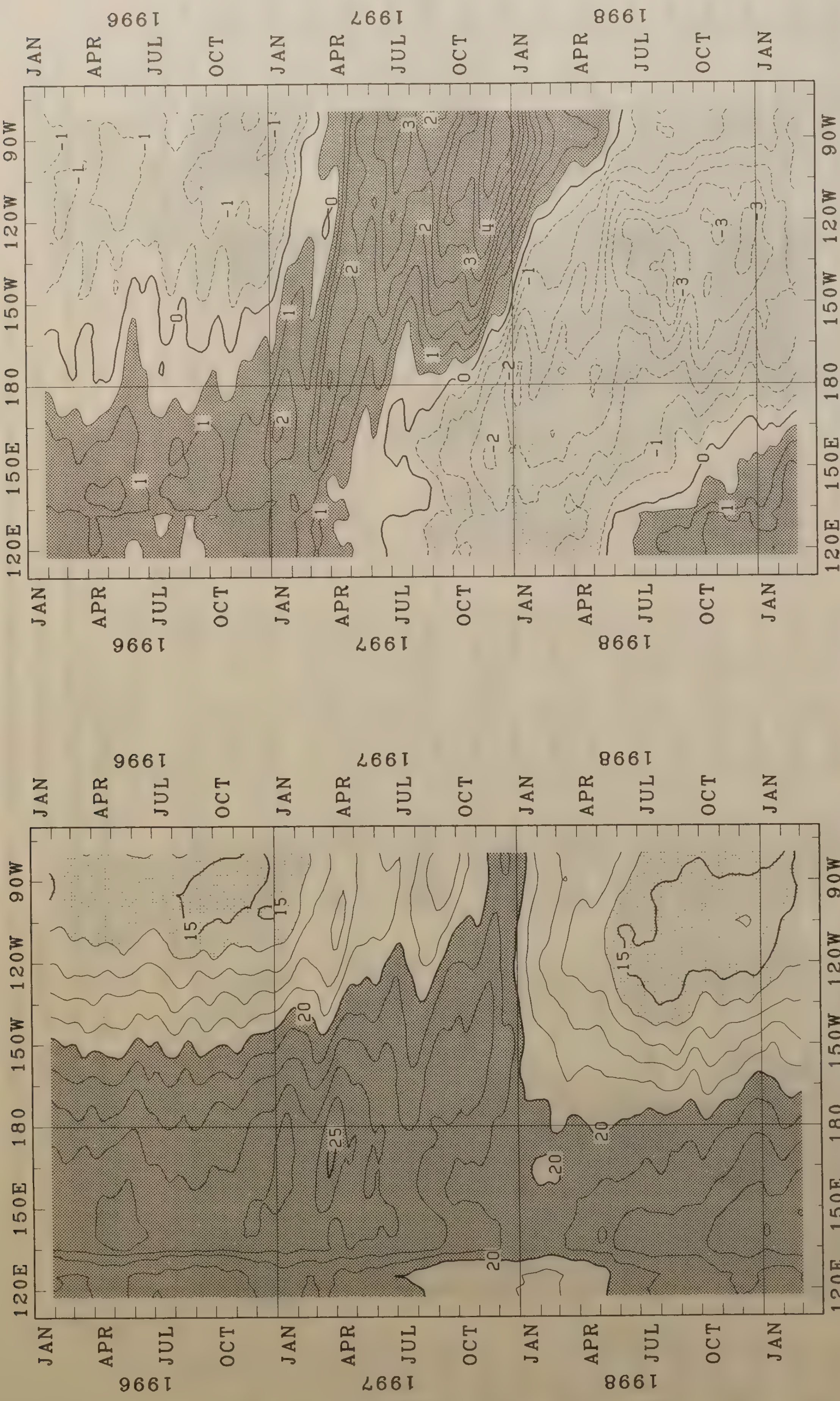
Table 1　El Nino Monitoring indices



第26図　赤道に沿った海面水温（左）及び偏差（右）の時間-経度断面図

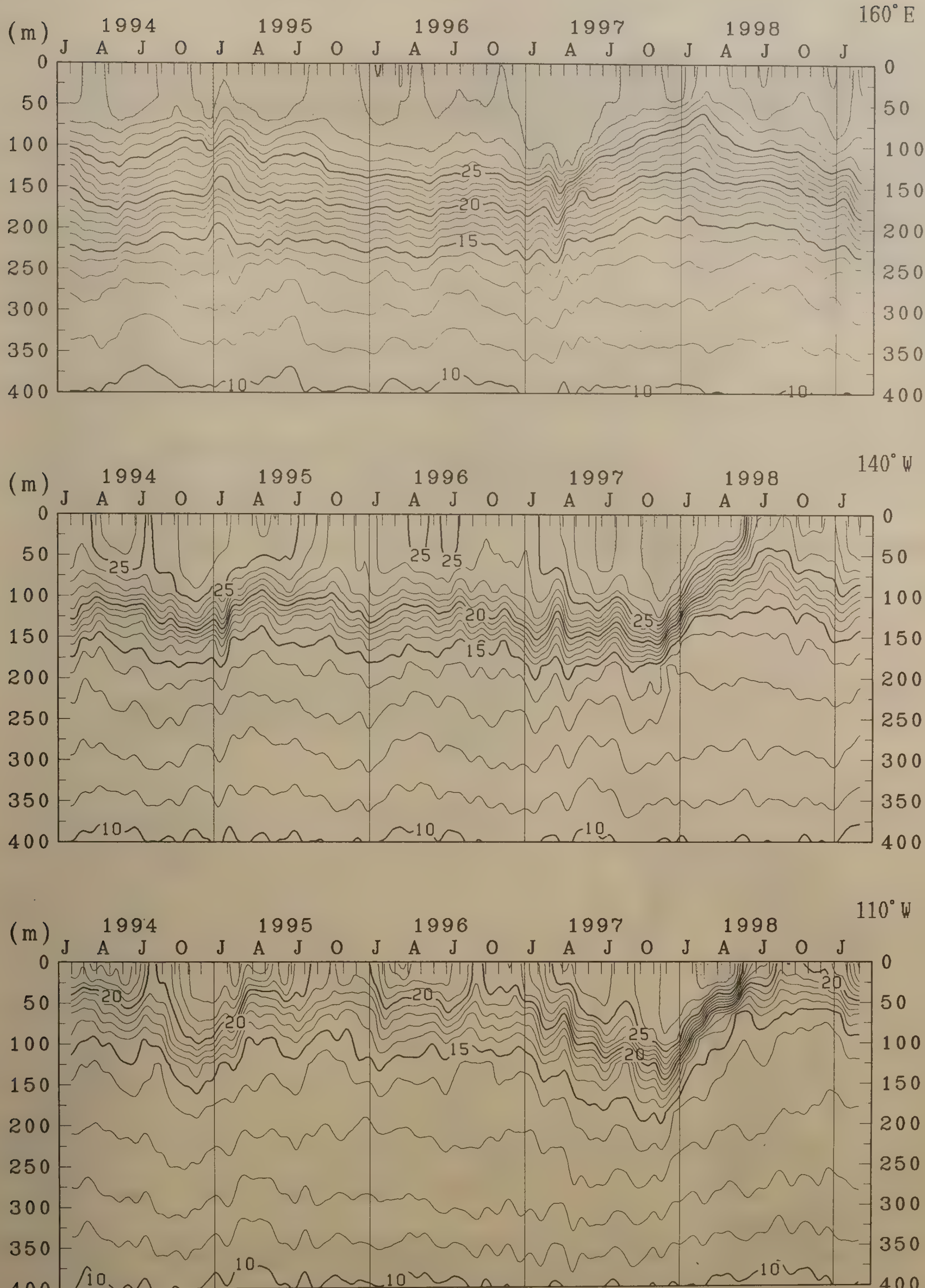
Fig.26 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2°N-2°S) in the global ocean. Contour interval is 1 °C (left) and 0.5 °C (right). Values greater than 28 °C are shaded and values less than 23 °C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第27図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

Fig.27 Time-longitude sections of ocean heat content in the upper 260 m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1997 base period means.



第28図　太平洋赤道域の表層水温の時間－深度断面図

(上：西部、中：中部、下：東部)

Fig.28 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

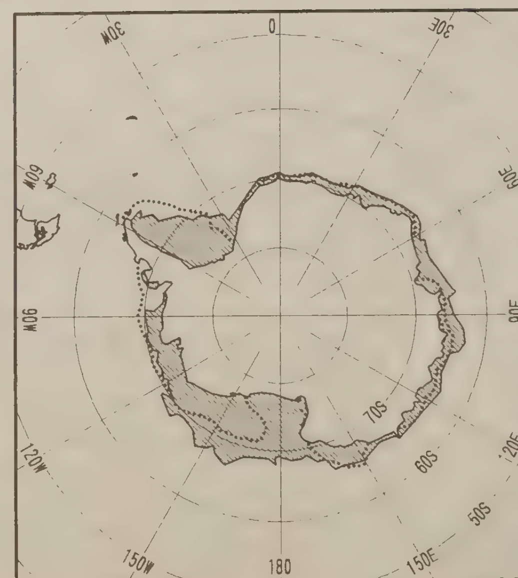


第29-1図　北極域の海氷図（1999年 2月12日）

Fig.29-1 Sea ice chart in the Arctic on 12 Feb. 1999.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).

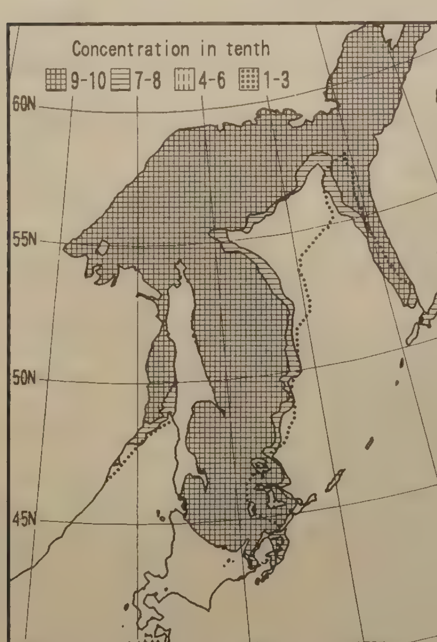


第29-2図　南極域の海氷図（1999年 2月12日）

Fig.29-2 Sea ice chart in the Antarctic on 12 Feb. 1999.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

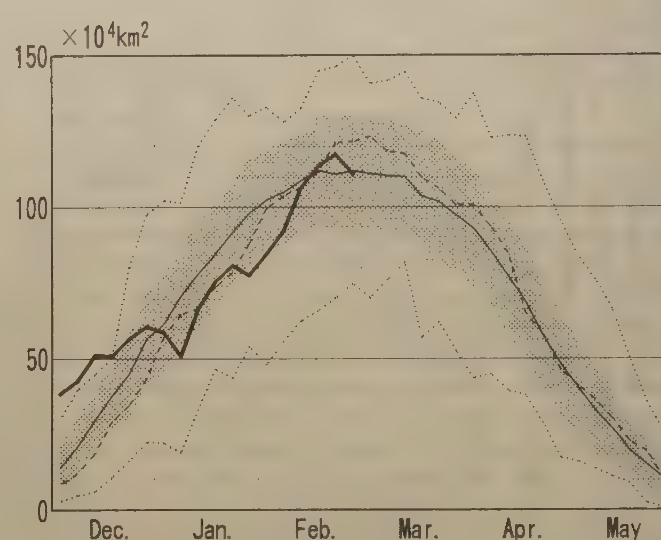
The data source is the National Ice Center (USA).



第29-3図 オホーツク海の海氷図（1999年 2月15日）

Fig.29-3 Sea ice chart in the Sea of Okhotsk on 15 Feb. 1999.

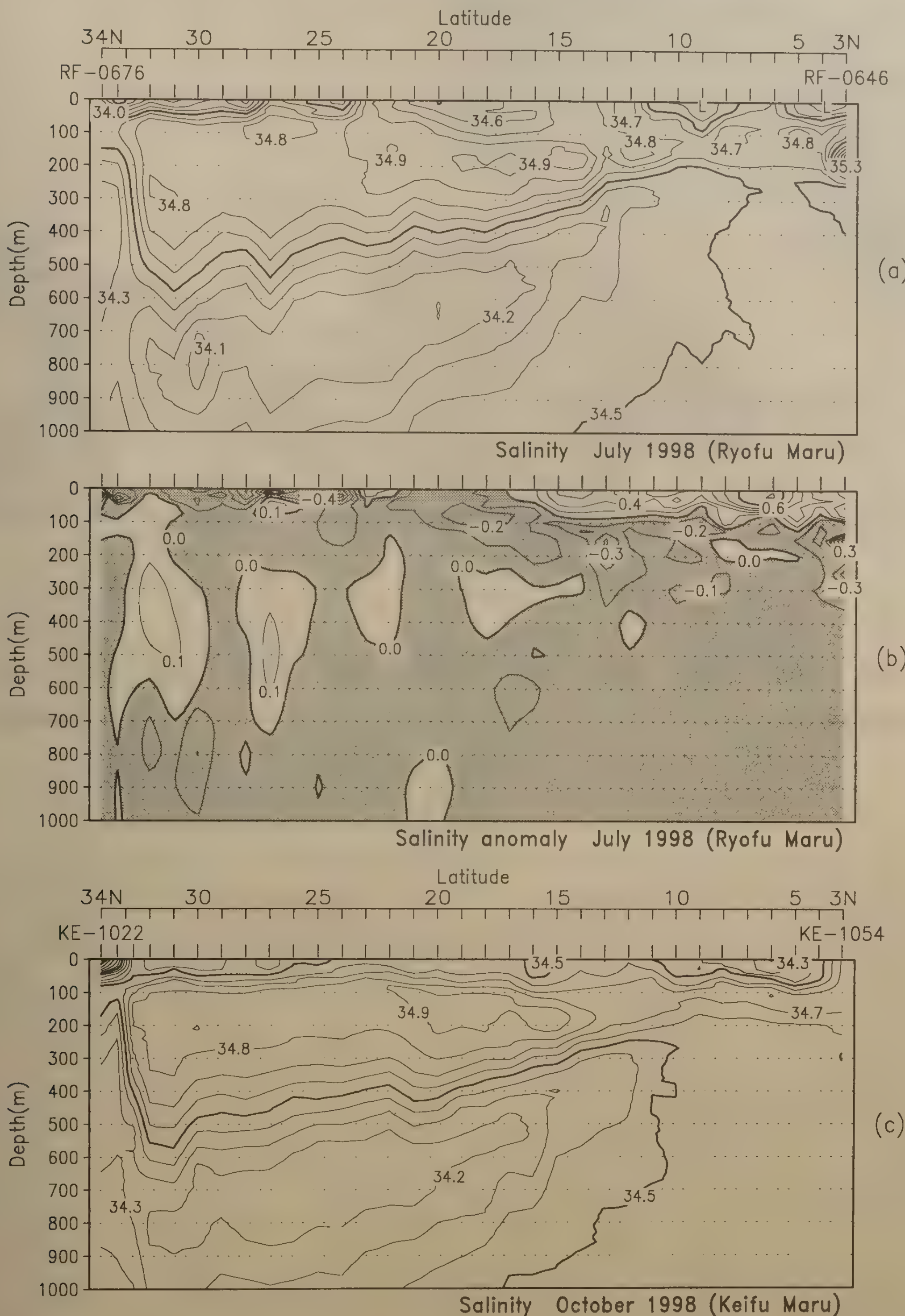
The dotted line denotes the mean ice edge averaged for the period from 1971 through 1995.

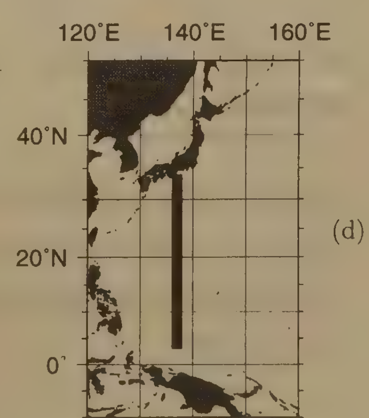


第29-4図 オホーツク海の海氷域面積

Fig.29-4 Time-series of 5-day sea ice extent in the Sea of Okhotsk.

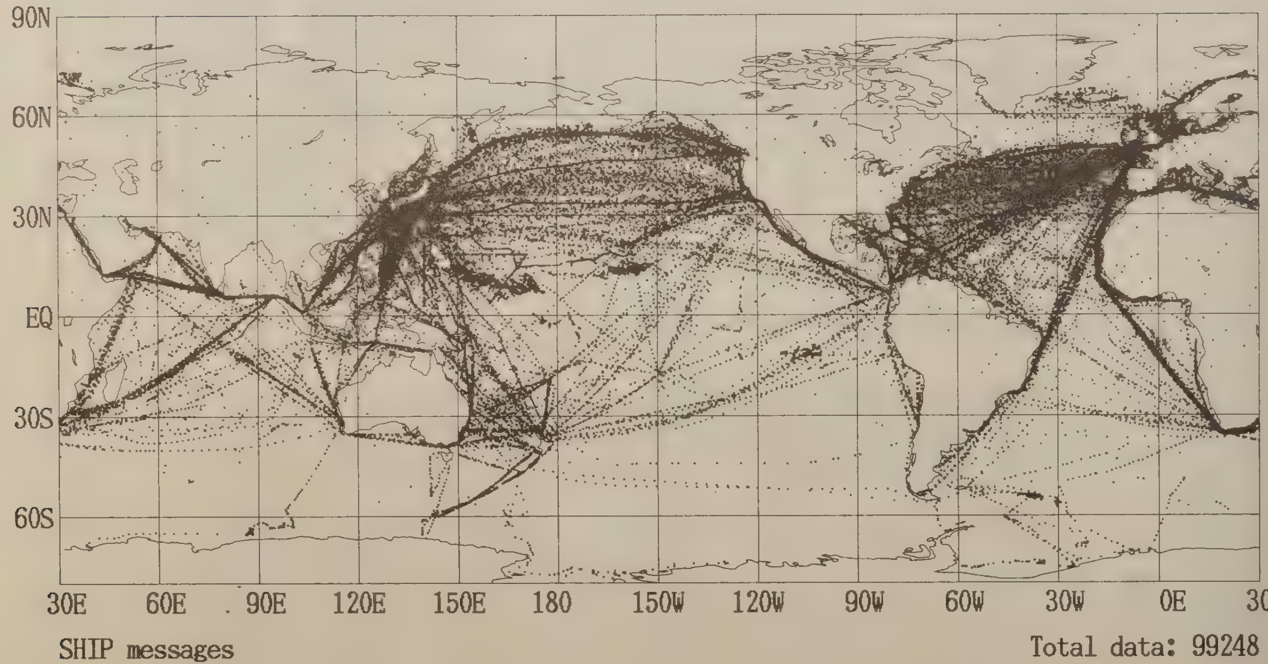
━━━━ : current season (1998/99)
──── : mean extent (1971-1995)
········ : maximum or minimum extent (1971-1998)
- - - - - : last season (1997/98)
(shaded) : mean $\pm 1\sigma$ (1971-1995)

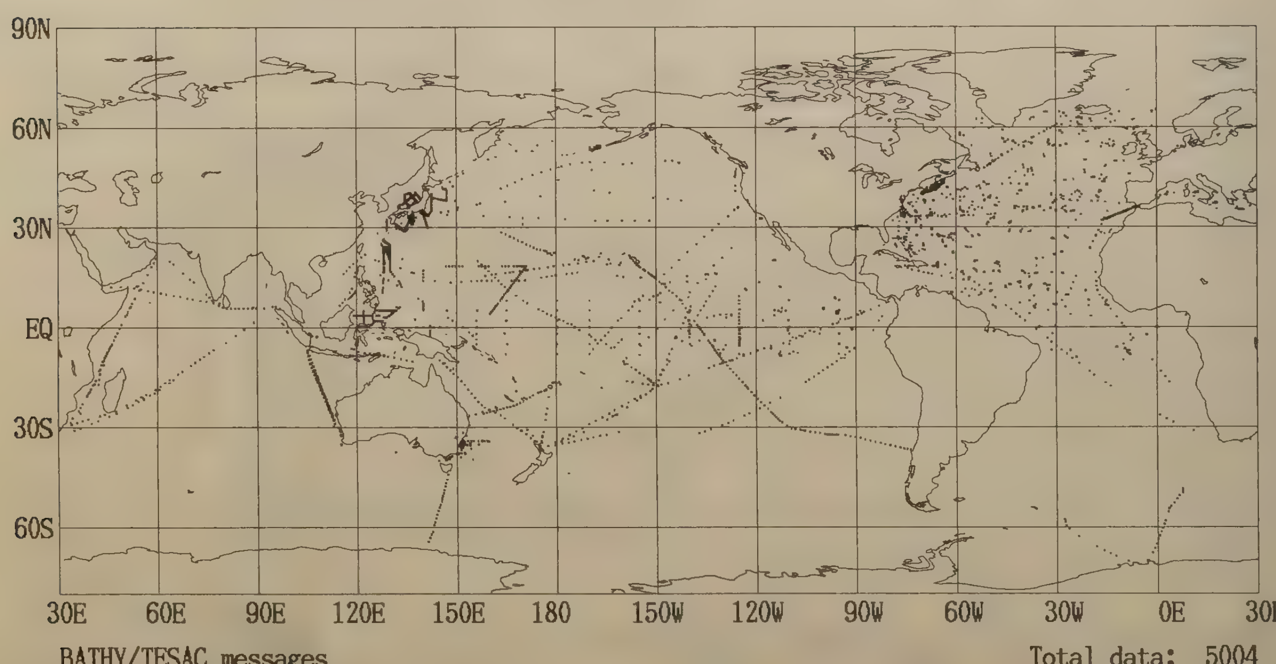




第 30 図 東経 137 度に沿った鉛直断面図. (a) 塩分 (1998 年 7 月), (b) 塩分平年偏差 (1998 年 7 月), (c) 塩分 (1998 年 10 月), (d) 観測位置図.

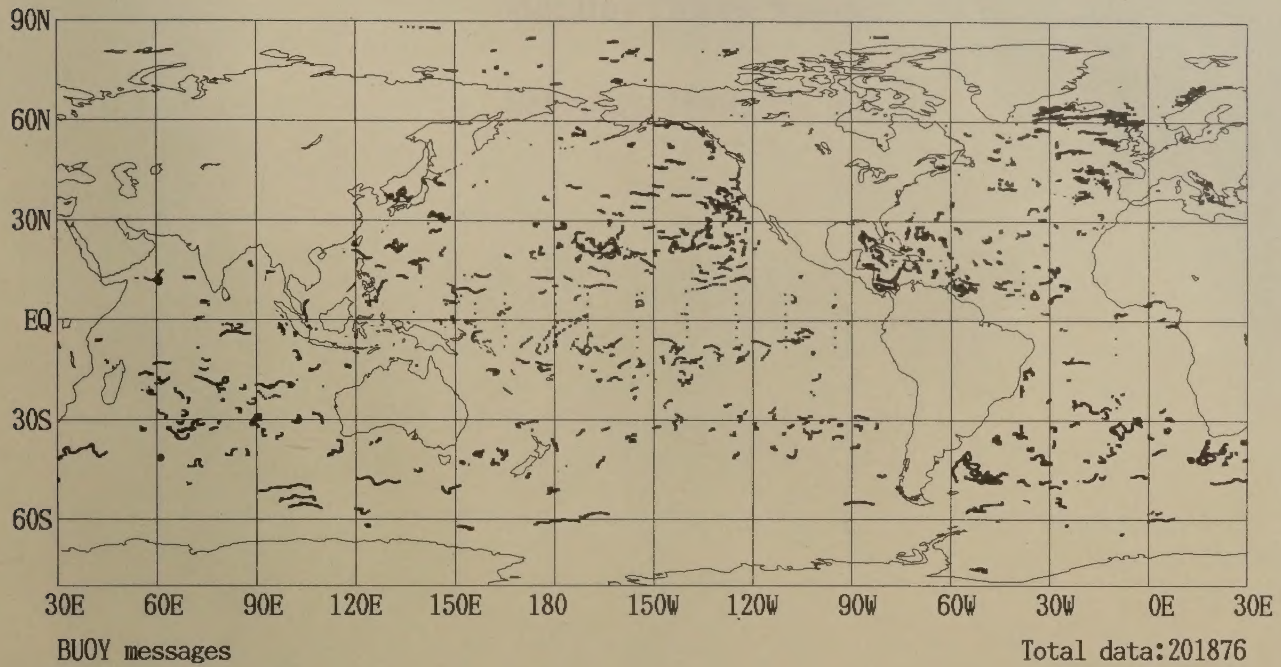
Fig. 30 Vertical sections along 137°E. (a) Salinity observed by R/V Ryofu Maru in July 1998, (b) Salinity anomalies observed by R/V Ryofu Maru in July 1998, (c) Salinity observed by R/V Keifu Maru in October 1998, (d) Location of oceanographic observations along 137°E. Anomalies are computed from the 1972–1990 base period means.

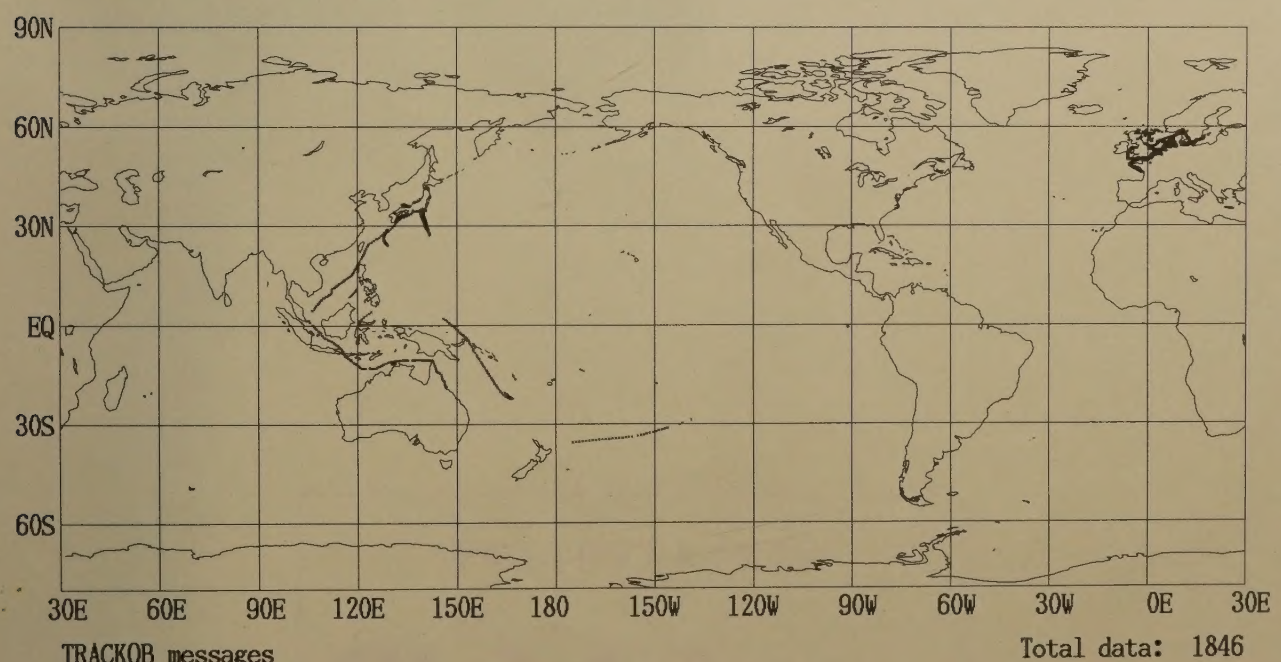




第31-1図　測点分布図(1999年 2月)

Fig.31-1　Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for FEB 1999.





第31-2図　測点分布図(1999年 2月)

Fig.31-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for FEB 1999.

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